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LEAFLETS

OF

BOTANICAL OBSERVATION AND CRITICISM.

BY

EDWARD L. GREENE.

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LEAFLETS

of

Botanical Observation and Criticism, [Vol. 1]

by

Edward L. Greene.

Distribution of Bidens vulgata.

Soon after having published this species I ventured a suggestion that, inasmuch as it is notably less common at the east than *B. frondosa,* it might have come to this side of the continent from the West (Pitt. iv. 250).

A recent September tour through parts of Indiana, Illinois, Wisconsin, and Minnesota gave the opportunity of observing the species in many western localities; and the opinion which I had almost adopted as to its western nativity is not confirmed. I found the plant everywhere, but everywhere much less common than its ally, *B. frondosa;* also almost invariably a tenant of cultivated grounds, gardens, cornfields, etc., whereas *B. frondosa,* in the upper Mississippi valley as in that of the Potomac, abounds in wild uncultivated lowlands along streams and margins of lakes and ponds, where *B. vulgata* is never seen.

I everywhere observed of *B. frondosa* that in its maturest autumnal state the whole herbage is of a bronzy purple; but *B. vulgata* remains green.

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A New Southern Violet.

In a recent allusion to the geographical distribution and variations of *Viola pedata*, I ventured the suggestion that it may in time be shown to consist of a number of definable species, or at least marked varieties (Pitt. v. 126).

Having indicated as a varietal segregate the plant of the U. S. midland prairie region, and which I shall here and hereafter denominate *V. inornata*, I wish to direct attention to a southern ally of the Middle Atlantic, *V. pedata*, which exhibits characters so pronounced that I wonder no one hitherto has noted them.

Before proceeding to the diagnosis of specimens I must make mention of the unpublished colored figure of supposed *V. pedata* made by Le Conte. As often as I have consulted that figure, so often has the conviction forced itself upon me that his subject must have been a form of *V. pedata* unseen by me, at least in a living state; a plant of remarkably slender habit, seven inches high from the crown of the rootstock to the extremity of the corolla, this last wanting but the sixteenth of an inch of being two inches from tip to tip of the light-blue petals; these last also wanting a certain firmness of texture in virtue of which the corolla of *V. inornata* at least, if not that of true *V. pedata*, is flat and stiff-looking in its perfect expansion. But in the corolla as represented by Le Conte there is seen over and above their extraordinary size, a certain half-undulating easy grace in the spread of the petals which is foreign to the flower of northern and middle country *V. pedata.*

It is well known that Le Conte's admirable work on violets was done chiefly in the field and at the farther South—the Carolinas, Georgia and I believe Alabama, and in our herbaria, among scores of *V. pedata* sheets—yes, hundreds of them—there are occasional specimens from the Carolinas southward which answer as well as dried specimens may, to this beautiful plate which Le Conte has left; and the specimens disclose one character of importance which none have mentioned, that is, a remarkably prominent spur to the odd petal. This organ is most conspicuous in a sheet of specimens collected on dry gravelly

hills at Saratoga, Mississippi, 4 April, 1903, by Mr. S. M. Tracy. These I take as the type of a new subspecies which may be called

VIOLA AMPLIATA. Of the habit and with the foliage of *V. pedata* but taller, commonly 5 to 8 inches high, glabrous or very nearly so, the rootstock not as stout, often ascending rather than erect: sepals thin, broader at base than those of the ally, more slenderly tapering, the margins merely serrulate-scabrous: corolla about 2 inches long, the petals thin, pale-blue, the odd one with a conspicuous stout upturned and almost hooked spur.

Besides the type specimens in my own herbarium, I find two sheets in the U. S. Herb. which seem to represent the species. The most undoubted of these is from Meridian, Miss., by Mr. Canby, 4 April, 1900. Of the two specimens one is six inches high, the other nine, and the plants are as slender as those of Mr. Tracy; the dry corollas measuring about 1½ inches, the sepals and spur as in Mr. Tracy's plants. The other one is from Auburn, Ala., 22 Apr. 1900, by Mr. Earle. Here the corolla is as large, but the two upper petals seem to have been red-purple. The specimens are from five to six inches high, slender, from ascending rootstocks; but the spur in these is not stout, nor has it a certain acutangular upper terminal corner, so to speak, which gives the somehwat hooked appearance to that of the type.

While ordinarily *V. pedata* and *inornata* have a merely saccate lower petal, this barely visible between the two sepals next it, there are nevertheless rare forms of these exhibiting a distinct and even conspicuous spur. In the U. S. Herb., one sheet, from New Providence, Penn., by A. A. Heller, May, 1900, has flowers with an evident spur, not long, yet long enough to be rather strongly curved. It terminates obtusely, with no hint of any angularity at the end. Another sheet, from Reading, Mass., by Chester Kingman, 17 May, 1897, has a peculiar, well elongated narrow upturned spur. The corolla here is 1¼ inches long, the petals all of one color, and all emarginate. In both these instances the plants are, in all except the spur, quite like the usual *V. pedata*, and do not connect with *V. ampliata*.

Similarly, a fine sheet of specimens of *V. inornata* from Iowa, stout, low, and scaberulous, and with the thick obtuse sepals of that species, show a distinct though not very long but stout curved spur, this as completely rounded at its terminus as the organ is in other northern forms here cited.

In the Wrong Genus.

While examining some *Potentilla* bundles lately in the U. S. Herb., I came incidentally to a sheet of specimens labelled *P. gracilipes,* Piper, n. sp., the first glance at which suggested a *Sieversia,* and an examination revealed the characters of that genus. It will therefore be called

SIEVERSIA GRACILIPES. *P. gracilipes,* Piper, Bull. Torr. Club xxvii. 392. The species has for its nearest affinity *S. sericea,* Greene, Pitt. iv. 50.

Further Segregates from Aster.

Somewhat late in summer seven years ago, following an old wood road up a mountain side in northern Pennsylvania, I paused for a moment in admiration of some nodding corymbs that in partial shade were peering a little above the rest of the woodland herbage and seemed as if they must be those of some asteraceous plant; though up to that time I had not seen, or even heard of any asteraceous plant with nodding heads. But on a near approach to the plants I discovered by the unmistakable cut of the foliage that this was what I had known well enough in herbarium specimens for perhaps forty years, what is called *Aster acuminatus.* Somewhat later that season I transferred roots of the plant to my garden near Washington, discovering what also had not, and has not until now been mentioned, that the species propagates by tubers rather by stolons. At the end of each long slender subterraneous branch a small organ is formed which, exactly resembles a small potato, and from each of these springs a plant for the next year.

Having studied this type in the living state for another season, I in 1897 labelled all my herbarium sheets of this species OCLEMENA ACUMINATA, having first noted that neither the achenes nor the pappus are those of the genus Aster, the former

being prismatic rather than compressed, and the latter much too fine and soft. As a genus, OCLEMENA bears much the same relation to *Aster* which *Erechtites* bears to *Senecio.*

I am also now persuaded that the genus is not monotypical, and would name as a second species O. NEMORALIS, this being of course the *Aster nemoralis,* Ait., which, seeing it was no *Aster,* I formerly transferred to *Eucephalus,* where it was not well at home. It has the same habit, and the same reproduction by tubers which the type species portrays, though its pappus is firmer, and its achenes, though 5-angled, are a little compressed. Whether its heads are nodding before expansion or erect I do not know, never yet having had the fortune of seeing the plant alive. That in the type species the heads are nodding before expansion has now at last been announced by Mr. Small in his new book already famous.

The genus VIRGARIA proposed by Rafinesque I have wished for years to be able so to extend as to include in it *Aster sericeus* and its allies. They are all wiry and coriaceous things as to texture, with silvery-silky foliage and peculiarly foliaceous involucres—plants abundantly distinct from the type of *Aster.* But *Virgaria concolor,* Raf., stands apart from the others in several particulars. Its mode of growth and propagation underground, its inflorescence and its flowers—those of the disk being never yellow, but at first white, then rich purple—and then its silky villous achenes, all combined bespeak its title to the rank of a genus from which its kindred of the west and south must needs be separated.

To them I accord generic rank under the name LASALLEA. Their heads are large and solitary; their disk-corollas at first yellow, then becoming brown; their achenes perfectly glabrous. The species seem to be about three: L. SERICEA (Vent. under *Aster*), L. NUTTALLII (*Aster montanus.* Nutt. not of Allioni) and L. PHYLLOLEPIS (T. & G. under *Aster*).

When in 1896 I was studying *Dœllingeria* (Pitt. iii. 50) as a necessary segregate from the Linnæan *Aster,* I would fain have made positive Nees' doubtful placing of *Aster ptarmicoides* in

that genus. But habitally this type is wholly unconformed to *Dællingeria*—as far from it as it is from typical *Aster* itself. It is even less repugnant to *Sericocarpus*, as Nees himself observed. But that genus has densely silky-villous achenes, while those of the type in question are perfectly glabrous, white and almost shining as well as rather strongly quadrangular and little or not at all compressed. The pappus, too, is very clear white even in maturest age and after long years in the herbarium; and this is not true of any of its supposed allies. And that the bristles of the pappus are visibly dilated at tip is a character here for the first time noted. By these marks, and by its almost filiform disk-corollas which are always white, and the thick and appressed involucral bracts, it must be admitted, rationally, in the rank of a genus, which I purpose calling UNAMIA.

Over and above the type species, which must be called U. PTARMICOIDES, the following seem specifically distinct:

U. FASTIGIATA. Leaves narrower than in *U. ptarmicoides*, entire, marked with a pair of lateral veins more or less distinctly anastomosing with the not very much more conspicuous midvein, the surface and margins scabrous; inflorescence strict and fastigiate, flat-topped, the peduncles closely bracteolate, the bractlets passing gradually into those of the turbinate involucre, which are acute.

Apparently local in moist sandy lands along the southern shore of Lake Michigan, the best specimens by L. M. Umbach, at Pine, Indiana. The rays are evidently white, otherwise I should have suspected it to be the var. *lutescens* of the type species. The long almost imbricate-bracteolate peduncles, turbinate involucres, (campanulate in *U. ptarmicoides*) and fastigiate cyme compel the recognition of this as at least a strong sub species.

U. GEORGIANA. *A. ptarmicoides*, var. *Georgianus*, Gray. In habit like the last, but less strongly fastigiate, the cyme not flat-topped, the lateral peduncles quite surpassing the terminal head, all the peduncles strongly bracteolate and the involucre still more acutely turbinate, the bracts narrow and acute, glabrous even marginally.

The real characters of this are here for the first time indicated. It is the acutely turbinate involucre of narrow pointed bracts which tells. The species seems to range westward from Georgia into the Indian Territory, and perhaps southern Missouri.

U. SUBCINERA. Stout and rigid, a foot high or more, subcinerous-scabrous: leaves large, oblong-lanceolate, entire, somewhat undulate, hardly acute, 3 to 5-veined and the lateral veins divergent: cymes short and broad, the branches of it and the pedicels strongly hispidulous, their bracts few, large, leaf-like: involucres large, campanulate, their thick acutish bracts hispid-ciliolate, sulcate on the back, the midvein being at the bottom of a distinct if not deep furrow: rays not large for the plant, evidently ochroleucous or yellow.

Near Ft. Meade, South Dakota, August and September, 1887, Dr. W. H. Forwood. Genuine *U. ptarmicoides* is in the collection from the same place, but this broad-leaved thing, pale with a peculiar rough-hairiness, is very distinct.

Neglected Eupatoriaceous Genera.

Respecting the genus which has *Eupatorium cannabinum* for its type, I have for some years past felt convinced that our verticillate-leaved purple-flowered plants, a group headed by *E. purpureum*, are its only representatives in America.

Nearly three years since I proposed the restoration of *Conoclinium* as a genus (Pitt. iv. 272), and in the course of the preparation of that paper, among other alterations which I made in my herbarium bundles was that of labelling under the generic name of OSMIA such of the species as were found referable to that evidently natural genus long ago proposed by Schultze.

Seeming compelled, in view of its excellent characters, to give the same recognition to the group named *Ageratina* by Spach (in allusion to the strong likeness of the plants to *Ageratum* rather than to genuine *Eupatorium*), I began a general revision of this genus under the name KYRSTENIA which Necker had assigned it long before the days of Spach. The manuscript has been lying for more than two years unfinished.

Meanwhile Mr. Small, in his Flora of the Southeastern States, has seconded my restoration of *Conoclinium* and also admitted *Osmia*. It is therefore opportune to present suggestions of the excellent titles to generic rank held by other assemblages of species of so-called *Eupatorium.*

KYRSTENIA (Neck. Elem. i. 81) has for its most historic and representative species two herbaceous plants known well in pre-Linnæan days, one of which Linnæus called *Eupatorium aromaticum* and the other *Ageratum altissimum* better known to us as *Eupatorium ageratoides*, a name assigned it by the younger Linnæus.

These two plants, and with them a host of their congeners, are so unlike true *Eupatorium* and at the same time so like *Ageratum* in foliage, inflorescence, uniserial involucre, and even as to flowers and fruits, that nothing but the fine-bristly rather than paleaceous pappus could have kept them apart from the genus last named, where, as already noted, Linnæus did actually place the first species. They differ from *Eupatorium* by a set of characters exactly corresponding to those by which *Erigeron* is held separate from *Aster.*

One must needs assume the Atlantic North American species just mentioned to be the proper type of KYRSTENIA. They are herbaceous perennials with opposite leaves and a corymbose inflorescence; their thin almost uniserial involucral bracts notably pointed.

I subjoin a list of representative species, all belonging to the flora of the United States, using the specific names at present in vogue for each under *Eupatorium*, save only in the case of *E. ageratoides* which alone has a specific name older than that in common use; and I give in parenthesis the place of publication of each as an *Eupatorium.*

KYRSTENIA AROMATICA (Linn.Sp. 839), VIBURNIFOLIA (Greene, Pitt. iv. 276), ANGUSTATA (Greene, l. c. 277), NEMORALIS (Greene, l. c. 278), TRACYI (Greene, l. c.), ABORIGINUM (Greene, l. c. 277), BOREALIS (Greene, Rhodora, iii. 83), CEANOTHIFOLIA (Muhl, in Willd, Sp. iii. 1755), ALTISSIMA (Linn. Sp. 839 under *Ageratum*; *Eup. ageratoides*, Linn. f. Suppl. 355), INCARNATA (Walt. Carol. 200), JUCUNDA (Greene, Pitt. iii. 180), MELIS-

SOIDES (Willd. Sp. iii. 1754), PAUPERCULA (Gray, Proc. Am. Acad. xvii. 205), ROTHROCKII, (Gray, Syn. Fl. 102), HERBACEA, ARIZONICA (Greene, Pitt. iv. 279, 280).

This typical group has many representatives beyond our borders in Mexico, Central and even South America, some herbaceous, others shrubby, of which I cite but few. K. GRANDIDENTATA (DC. Prodr. v. 167), AMPLIFOLIA (Gray, Am. Acad. xv. 28), EUONYMYFOLIA (Greene, Pitt., iii. 31) BELLIDIFOLIA (Benth. Pl. Hartw. 43), OREITHALES (Greenm., Am. Acad. xxxii, 308) PAZCUARENSIS (HBK., N. Gen. N. & Sp. iv. 123), GRANDIFOLIA (Regel, Gartenfl. i. 102), AGERATIFOLIA (DC., Prodr. v. 173), CILIATA (Less., Linn. vi. 404), GLECHONOPHYLLA (Less., lc. 105), CALAMINTHÆFOLIA (HBK., N. Gen. iv. 129), DONNELL-SMITHII (Conlt. Bot. Gaz. xvi. 95), COLLINA (DC. l. c. 164), ESPINOSARUM (Am. Acad. xv. 28), BENTHAMI (Klatt. Leopoldina, xx. 90), DELTOIDEA (Jacq. Schœnbr. iii. 63), COAHUILENSIS (Gray, Am. Acad. xvii. 205), GUADALUPENSIS (Spreng. Syst. iii. 414).

On the Pacific slope of the United States we have no typical KYRSTENIA; though a distinctively Mexican group of species with tufted stems from a woody base, alternate leaves, thyrsoid-panicled heads, and involucres not quite as simple, is represented in the mountains of California and northward by a single rather handsome pink-flowered species, K. OCCIDENTALIS (Hook. Fl. i. 305). Among Mexican species of this habit are K. KŒLLIÆFOLIA (Greene, Pitt. iii. 31), BREVIPES (DC. Prodr. v. 168) and some of the following here proposed as new.

K. THYRSIFLORA. Stems stout, erect, herbaceous, 2 feet high or more, simple up to the contracted and somewhat thyrsiform inflorescence and very leafy, all the leaves alternate, pale but cinereous-scaberulous rather than glaucescent: leaves ovate and scarcely acute, or lance-ovate and acute, ascending on short petioles, distinctly or obscurely serrate-toothed: pedicels and biserial bracts of involucre densely scabro-puberulent; corollas white, with slender tube, short-funnelform throat and long spreading lobes: achenes not strongly angled, glabrous.

Chihuahua, Mexico, chiefly southward in the State; collected by Palmer, Pringle and E. A. Goldman, and always distributed for *E. occidentalie* var. *Arizonicum;* which is a strange proposition.

K. BETULÆFOLIA. Near *K. occidentalis*, like it in size and habit, but all the foliage opposite; leaves of broad and deltoid outline, with an abrupt acumination and coarse serrate teeth: inflorescence much more open and heads fewer; bracts of the involucre broader, firmer, rather strongly 2-ribbed: corolla pinkish, with broad and short throat and much more deeply cleft limb: achenes black, hirtellous.

This is Mr. Pringle's n. 1263 from Chihuahua, distributed for a variety of *Eupatorium occidentale*, from which it differs widely by its opposite and very birch-like leaves, and still more certainly by the form of its corollas, this in K. *occidentalis* being narrow and tubular in comparison, with very short teeth.

K. SUBINTEGRA. Shrubby, glabrous: leaves 2 or 3 inches long, deltoid-ovate, acuminate, subtruncate or abruptly tapering at base, short-petioled, obscurely and remotely denticulate: cymes subsessile among reduced leaves at the ends of all the branches: involucres long and narrow, the inmost of the few bracts striate, the outer glabrous or glandular-puberulent: corollas with slender tube and funnelform rather deeply cleft limb: achenes setulose.

Pringle's 3311 from San Luis Potosi, published by Mr. Robinson as a variety of *E. Espinosarum*, though specifically distinct by characters of foliage, inflorescence, and especially by its elongated heads.

K. AMPLISSIMA. Stout, several feet high, branched above to form a somewhat leafy thyrsoidal inflorescence: larger leaves 5 inches long, 3 or 4 in breadth, obtusely somewhat deltoid-ovate, crenate, glabrous: pedicels and rather large involucres with a short harsh pubescence: corollas tubular-funnelform; achenes glabrous.

Pringle's 2878, from Jalisco, Mexico, 1889, distributed as a variety of *E. amplifolium*, from which this differs exceedingly in habit, foliage, inflorescence and achenes; for in the real *K. amplifolia* there are angular and acute leaves, a naked-peduncled terminal cyme, scaberulous achenes, etc.

K. RUFA. Herbaceous, erect, 2 feet high or more, simple up to the cymose-panicled summit, the stem, and leaves beneath, of a dark red-purple, the petioles and nodes hirsute with a

ferruginous retrorse hairiness: leaves firm, ovate-elliptic, 2 or 3 inches long, lightly serrate, acuminate, short-petioled: bracts of involucre striate, lightly pubescent, commonly fleshy-tinted: corolla with slender tube and short funnelform limb: ovaries pubescent.

Pringle's 8028, distributed under the name *E. ciliatum*, though not like that in either aspect or character.

K. ACUTA. *E. ageratifolium* var. *acuminatum*, Coult. Contr. U. S. Herb. 179. Suffrutescent, rigid, brittle, the branches and lower face of leaves pubescent: leaves deltoid-ovate, coarsely subserrate-toothed on the sides, the subtruncate base and short acumination entire; petioles slender, shorter than the blades: heads rather few and large in a broad sessile cyme: involucres somewhat imbricate, the rather more than biserial bracts linear, acute, 2-nerved: corolla tubular-funnelform, short achenes setulose both along the raised and whitened angles and in a less degree between them: pappus firm, yellowish.

This is in many ways very unlike *K. ageratifolia*, and so much so as to its involucre that I have hesitated before admitting it into *Kyrstenia.*

K. LÆTA. Rigidly shrubby, divaricately branched, the flowering branchlets densely leafy, the foliage, pedicels and involucres of a bright green; strongly resinous-viscid: leaves deltoid-ovate, acute, obscurely crenate-dentate, closely reticulate-renulose: heads short and smallish, in sessile crowded compound cymes: bracts of involucre biserial, subequal, oblong-lanceolate, 2-nerved below: achenes minutely setulose along the thin sharp angles.

Foot of Monte Alban, Oaxaca, Mexico, 23 Oct. 1894, C. L. Smith; distributed for *E. calaminthæfolium*, to which it bears no near relation.

K. CALOPHYLLA. Shrubby; branches suberect, ending in a short-peduncled cyme: leaves ½ to ¾ inch long, suborbicular to subdeltoid-ovate, somewhat crenate-toothed, glabrous, coriaceous, remarkably scrobiculate beneath, the reticulations circumscribing shallow depressions: bracts of involucre scarcely biserial, oblong, acutish, purple-tipped: slender corollas pinkish; achenes pubescent.

Near Saltillo, Mexico, June, 1898, Palmer (n. 318 in U. S. Herb.); the specimens labelled *E. calaminthæfolium.*

K. PARVIFOLIA. In habit near the last, but abundantly leafy with mostly deltoid ovate entire leaves only ¼ to ½ inch long, not coriaceous, smooth and glandular-punctate beneath; cymes sessile, surpassed by slender leafy-bracted branchlets: bracts of involucre biserial, oblong-lanceolate, acute, pubescent: flowers pinkish: achenes scaberulous and glandular.

Also from near Saltillo, Palmer (n. 289 in U. S. Herb.), also called *E. calaminthæfolium*, though most distinct, and with copious small leaves recalling those of *Mitchella repens*.

The history of what has lately begun to be called *Eupatorium capillifolium* is uncommonly replete with interest. In aspect it is so exceedingly unlike the rest of the Eupatoriaceæ, and so completely imitates *Artemisia*, that when early in the eighteenth century it became known in Europe the botanists all called it a new *Artemisia*, Dillenius leading the way in 1732, Lamarck in 1784 being perhaps the last author to continue it under that genus; Walter in 1785 being the first to pronounce it an *Eupatorium;* this disposal of it being adopted by Willdenow in 1803, the celebrated author of Michaux's Flora in the same year transferring the type to the Asteraceous genus *Chrysocoma.*

When conservative authorities are at such extremes of disagreement as to the generic status of a type, the end of controversy about it is apt to be reached by conceding to it the rank of a genus; and this, for the type in question appears to have been proposed by Wallroth in 1822. His paper I have not seen, but only very authentic citations of it. He named the plant TRAGANTHES TENUIFOLIA; and yet, within some five or six years thereafter, Cassini, the most accomplished and at the same time the least conservative of nineteenth century synantherologists, for some reason declines Wallroth's very rational proposition, and proceeds to assign it a place under *Mikania*, calling it *M. artemisioides;* acknowledging that it fits the place not at all well, and failing to give any good reason for overruling the judgment of Wallroth.

The group is a small one, but so strongly marked in habit, that I have no doubt of its ultimately being accepted as a genus, under the name TRAGANTHES, the species over and above the

original one, to take names as follows: all having been named under *Eupatorium* by the authors indicated: T. COMPOSITIFOLIA (Walt. Carol. 199), PINNATIFIDA (Ell. Sk. ii. 295), LEPTOPHYLLA (DC. Prodr. v. 176), EUGENEI and PECTINATA (Small. Fl. 1165).

By far the greater proportion of the United States Eupatoria belong to a group of herbaceous perennials with opposite leaves, and white flowers in sessile terminal compound corymbs; the involucral bracts quite as few as in *Kyrstenia*, even fewer, but in two or more very unequal series, the individual bracts of firm texture, not ribbed or obviously nerved, obtuse or acute, often white-margined or even scarious-tipped. The corollas are small, consisting of a short tube and equally short, narrow funnelform throat or limb, the color always white; style-branches not short, notably clavellate. Both involucres and achenes apt to be strongly gland-dotted; the fine white pappus-bristles from scabrous to barbellulate.

Of this assemblage I take *E. perfoliatum*, Linn., to be about the oldest type, and name the genus UNCASIA, transferring to it by name the following: U. PERFOLIATA (Linn. Sp. 838), TRUNCATA (Muhl. in Willd., Sp. iii, 1751), CUNEATA (Engelm. in Torr. & Gray, ii, 88), SESSILIFOLIA (Linn. Sp. 837), ALTISSIMA (Linn. Sp. 837), ROTUNDIFOLIA (Linn. Sp. 837), SCABRIDA Ell, Sk. ii, 298), PUBESCENS (Muhl. in Willd. Sp. iii, 1755), SEMISERRATA (DC. Prodr. v. 177), CUNEIFOLIA Willd. l. c. 1753), HYSSOPIFOLIA (Linn. Sp. 836), TORTIFOLIA (Chapm. Bot. Gaz. iii, 5), LINEARIFOLIA (Walt. Carol. 199), LECHEÆFOLIA (Greene, Pitt. iii, 177), TORREYANA (Short, Supplem. 5), LEUCOLEPIS (Torr. & Gray, Fl. ii, 84), ALBA (Linn. Mant. 111), PETALOIDEA (Britt. Bull. Torr. Club, xxiv, 492), VERBENÆFOLIA (Michx. Fl. ii, 98), ANOMALA (Nash, Bull. Torr. Club, xxiii, 106), MOHRII (Greene, contr. U. S. Herb. vi, 762), RESINOSA (Torr., DC. Prodr. v. 176), MIKANIOIDES (Chapm. Fl. 195).

With the exception of *U. serotina*, which ranges southward into Mexico, I have not seen any Mexican Eupatoria that are of this genus; but in South America there seem to be a number of species; U. GLOMERATA and PALLESCENS (DC. Prodr. v. 154) for mere examples, and, for one that in aspect recalls *U. perfoliata*, U. SALVIA (Colla).

The Logic of It.

At page 142 of the Third Volume of Torreya one reads a sort of diatribe against a man in Italy who has lately not only perpetrated some duplicate binary names in zöology, but also shown himself unaware of the circumstance that such a thing had been done before.

I have no sympathy with narrow provinciality and ignorance —though it occurs in many places outside of Italy—and I quite enjoy the keen rebuke administered to that malacographer, and to some other people nearer home, by the writer in Torreya. At the same time I wonder why the critic did not take his malacologist to task for another piece of innocency which, if less ridiculous, is more dangerous. I refer to his assertion, as quoted by the critic, that these duplicate names result from his having retained the "original Linnæan names for the species, though these may have been chosen to denote the genus." The man evidently thinks that these appellations which he has been doubling np came into existence there in the margins of the Linnæan pages as species names, and were afterwards placed in the rank of generic names; while the fact is that not one such name is original with Linnæus. They all existed as genus names before Linnæus.

Now such an inversion of history as this Mediterranean malacologist makes in calling them "original Linnæan names" seems to me the really reprehensible fault in this paper as quoted. Why is this expression of a palpable untruth allowed to pass unscathed? Is it perchance needful in order to secure currency for these *Cat cat, Dog dog*, names, that one should try to keep alive the moribund faith in that mythical Linnæus in whom our forefathers believed, who was supposed to have been the original author and promulgator of a scientific nomenclature for groups of living entities? Is some survival of this myth to account for the critic's silence as to this error?

Some dozen years ago, I was told by an aged gentleman that his father, a New York naturalist at the beginning of the nineteenth

century, assured him that, at a public celebration of the centenary of Linnæus, there was displayed, writ in large letters, this motto: "God Created; Linnæus Named." With admirable terseness did this express what a century ago was the general opinion, that Linnæus had been the wonderful man with whom had originated both genus names and species names for animals and plants. Is there, then, after the lapse of yet another century, here and there a man in Italy, and here and there a man in New York, who would keep alive this antiquated cult?

As regards duplicate binary names, they are naturally offensive to every man of common sense, not to say of literary or scientific good taste; and I have no doubt there are botanists, if not zoologists, who while they openly employ them yet secretly abhor them.

But it is not so much the names themselves, their absurdity and senselessness to which we object, as it is the groundless assumption on which they are based, namely, that Linnæus is the father of nomenclature and that the names duplicated do in their singleness belong to him by right of priority; the truth being that all of them are genus-names, and were all current, some of them for centuries, before Linnæus.

As regards the measure of success attending recent efforts to establish duplicate binaries, I do not see what influence this can have upon the thought and action of the scientific and scholarly; for these as a class, unless they have resigned individual freedom of thought and action, are governed by principle and guided by reason. As an argument, the fact that a multitude follows a certain course, is more in use with politicians than with botanists and zöologists. It is true that both the contending parties as to nomenclature in this country have used this argument; but neither has thereby added strength to a cause, or dignity to a position.

But now, had I been in the critic's place, advocating duplicate binaries, felicitating my party on the growing popularity of these nomenclatorial deformities, and citing the most significant instances of their use with authors, I do not think I could have failed to see in this much berated Italian malacologist about the most notable example of them all; for he alone among them—

if we except the case of Hill in the Hortus Kewensis—seems to have acted without known precedent, and therefore independently; arriving at this course by his own individual reasoning and reflection. Through a rather discreditable innocency of all that is going on in the nomenclatorial world outside of Italy, he lays down for himself a line of procedure which is, to his mind, new; and in having followed it, as it were all alone, he must be credited with the virtue of a strong independency that is somewhat rare, and which merits praise. And if examples are to stand for arguments his, unless he should by and by retract, may perhaps, outweigh the force of Hill's example of so long ago; for he, having once propounded *Cyanus Cyanus*, *Mariana Mariana* and one or two more like them, repented of his error and declined to make other such names; which, by the way, the critic did not mention.

Certain Polygonaceous Genera.

Some twelve years have passed since in the Flora Franciscana, I indicated, though indistinctly, what was then and has ever since been my opinion that the groups subgenerically known as *Bistorta*, *Persicaria*, and *Bilderdykia* ought all to obtain recognition as proper genera; a rank which had been universally conceded to them up to the time when Linnæus, with his fascinating but unphilosophic artificialism, introduced what was fated to be a long epoch of retrogression in the history of natnral classification.

During the last nine years, in my herbarium, these and other genera allied to them, have been segregated, each under its own name; and I now desire that a more open presentation of my ideas along this line of study should be made without further delay.

Bistorta (Cæsalpino de Plantis, 167, (1583) has long seemed to me one of the most pronounced generic types in this whole family, in view of its strong habital and vegetative characters. In these respects it has more in common with *Lapathum* (erroneously called *Rumex* iu these days) than with any other genus. In all but the inflorcscence it closely imitates the dock in aspect, and like it the herbage wants the pellucid dots or glands that mark the genus *Persicaria;* and this kind of vegetative character is allowed great weight in plant classification generally.

The contortions of the root in this genus are peculiar, and early gave rise to such generic synonyms as *Colubrina* and *Serpentaria;* while in England it was of old commonly called Snakeweed, as Gerarde testifies. This quaint old author, by the way, reports that the herbage was used in some parts of England "as an excellent pot herbe," and also adds, what all do not know, that "it is called Bistorta of his writhed rootes."

The following are some of the authors of renown who may be consulted upon this type in the rank of a genus, and under this name, since Cæsalpino: Ray, Meth. 1 ed. 68 (1682); Tour-

Leaflets, Vol. 1, pp. 17-32, Jan. 5, 1904.

nef. Elem. 412, t. 291 (1694) and Inst. 511, t. 291 (1700); Ray, Meth. 2 ed. 22 (1703); Linn. Fl. Lapp. 115 (1737) and Fl. Suec. 116 (1745); Hill, Brit. Herbal., 488 (1756); Adans. Fam. 277 (1763); S. F. Gray, Nat. Arr. ii. 267 (1821); Raf. Fl. Tell. ii. 12 (1836) Spach. Phaner. x. 538 (1841); Fourreau, Trans. Linn. Soc. Lyon. xvii, 146 (1869).

Let me remark that if I have here attributed BISTORTA as a genus to Cæsalpino, it has not been that the name originated with him. The type was figured under this name by Tragus as early as 1552; but Cæsalpino was the first of botanists to define genera, and arrange them in a natural sequence. He is the real Tornefort, and a century earlier than the one who bears that name, and has usually the credit of having laid the foundations of Systematic Botany.

The type species rejoices in some diversity of binary names, one of which, being invested with the right of priority, I would adopt; adding a partial list of the authors who have employed it: B. MAJOR, Tragus (1552), Dodonæus (1583), Thalius (1586), Gerarde (1597), Clusius (1601), Tabernæmontanus (1625), Ray (1696), and many more of the pre-Linnæans. Then, since 1753, S. F. Gray (1821). By the synonym *B. vulgaris*, Hill, Brit. Herbal, 488 (1756); also *B. officinalis*, Raf. Fl. Tell. iii. 12 (1836) and Fourreau, l. c. (1869).

Some other species of BISTORTA, indigenous to North America, are B. VIVIPARA, S. F. Gray, l. c., and B. AMERICANA, Raf. l. c., this based on *P. bistortoides* Pursh; B. LINEARIFOLIA, CEPHALOPHORA, VULCANICA, JEJUNA, BERNARDINA, GLASTIFOLIA (Greene, Pitt. v. 197-199, under *Polygonum*); also B. MACOUNII (Small, in Macoun, Pl. Pribil. 570) and PLUMOSA (Small).

The following may be added to the number of recognizable North American species.

B. LILACINA. Slender, a foot high or more from a stoutish contorted fibrous and chaffy-crowned root: leaves lance-linear and linear, 3 to 6 inches long, retrorsely scaberulous beneath and with a broad flat striate midvein without other manifest nervation, the margins crisped in the large, in the narrower not so, in all revolute: ocreæ an inch long, ending in a short scarious cup and a linear very erect leaf 1 or 2 inches long: spikes ovoid

or short-cylindric; bracts ovate-lanceolate, caudately pointed: flowers at first white, changing in age to lilac-purple.

In the mountains near Pagosa Peak, southern Colorado, at 12,500 feet C. F. Baker, 28 Aug. 1899; distributed for *Polygonum bistortoides;* resembling *B. linearifolia* and with leaves quite as narrowly linear, but otherwise very different.

B. CALOPHYLLA. About 2 feet high, the lowest leaves about 10 inches long including the 3-inch petiole, all from a short stout contorted and fiber-bearing root: blades of leaves oblong and elliptical, flat even to the slightly wavy margin, glabrous throughout, very bright-green above, glaucous beneath, with broad flat striate midvein and obvious though delicate feather-veins: ocreæ 1½ to 2 inches long, ending in a short scarious rim and a rather large oblong-lanceolate spreading leaf: spike ovoid to subcylindric, 1 to 2 inches long; lower bracts round-obovate and toothed, the upper narrower and acuminate: flowers milk-white, drying cream-color.

Subalpine in the mountains of southern Colorado; Baker, Earle and Tracy's 373 from 9,000 feet on Chicken Creek, and Bakers n. 293, from near Pagosa Peak at 10,500 feet are the types; the species noteworthy by its large handsome foliage, and recalling the far northwestern *B. glastifolia* which has a much firmer foliage reticulate-venulose, and underneath lepidote-puberulent.

B. LITTORALIS. Allied to *B. vivipara* but large, nearly 2 feet high, the rather slender stem and long leaves from a thick horizontal bent rootstock: lowest leaves a foot long, the petioles rather longer than the linear or lance-linear blades, these subcoriaceous, abruptly acute at both ends, glabrous on both faces, very glaucous beneath, the midvein thick but rounded, not flat and striate: spikes 2 to 4 inches long, bulbilliferous only at and near the base: bracts subreniform-ovate, toothed across the broad summit and with a short subaristiform acumination.

Shores of Yes Bay, Alaska, 20 July, 1895, Thomas Howell, n. 1048 in my set of his plants. The large very sharply outlined coriaceous leaf-blades strongly recall the fronds of some simple-fronded ferns, both by outline and the venation.

B. OPHIOGLOSSA. Stems several, very erect, 4 to 6 inches high

from a stout ascending rootstock: basal leaves elliptical to elliptic-oblong and oblong-linear, subcoriaceous, $\frac{3}{4}$ to $1\frac{3}{4}$ inches long, on slender petioles not so long, glabrous above, pale and hairy beneath, the thick margins revolute; cauline leaves mostly 1 or 2 only, as long as the others but linear, very erect: spikes 1 to $1\frac{1}{2}$ inches long, linear, dense, bulbilliferous to the middle: bracts broadly ovate, entire, tapering to a short but conspicuous acumination.

An inland species of Alaska, the specimens from Ranch Creek in the Yukon Valley, 26 June, 1899, by M. W. Gorman, and distributed for *Polygonum viviparum*.

B. LEPTOPHYLLA. Subterranean parts not seen: upright stems 2 feet high: basal leaves 8 to 12 inches long, only $\frac{3}{4}$ inch broad, linear, tapering to a very short petiole, acutish, glabrous on both faces traversed underneath by a broad flat midvein and delicately reticulate-venulose, the margins thin and somewhat crisped; not in the least revolute: ocreæ an inch long, terminating in an oblique red-brown scarious appendage and a small leaf, this lance-linear to oblong-linear: spike 1 to 2 inches long, oblong to cylindric: bracts ovate or ovate-lanceolate, but with an almost aristiform acumination from the truncate or even emarginate upper end: flowers white.

Frequent in the higher Sierra of California, here described from specimens collected forty years ago by Bolander. The leaves are remarkably like those of *Rumex crispus* though narrower.

B. SCOPULINA. Stout and low, the several stems 3 to 5 inches high from a more or less rounded and compacted mass of short rootstocks, the whole much like a tuberous root in appearance; leaves all erect, elliptical to oblong-linear, $\frac{3}{4}$ to 2 inches long, firm if not subcoriaceous, bright green and glabrous above, pale and minutely rough-hairy beneath, the midvein neither broad nor flattened, traversed by a raised line in the middle, veinlets obsolete except at the very margin, there abruptly prominent: spikes commonly 2 or even 3 inches long and longer than the stem itself, bulbilliferous for more than half their length, the floriferous portion thick and dense: bracts suborbicular, entire, cuspidate-pointed.

This is of the mountains of northern and middle Colorado,

the type specimens from Cameron Pass at an altitude of 11,700 feet, collected by C. F. Baker, 16 July, 1896.

Of all the new species of *Bistorta* here proposed the types are in my own herbarium ; and doubtless many more species not yet described exist in other herbaria. The characters on which species may be established—those of rootstock, leaf, spikes and especially their bracts—are herein sufficiently indicated, and other students of the group will carry forward the work here begun upon our North American forms.

The genus is one of many which while but feebly represented in the floras of Europe and eastern North America, exhibit a multiplicity of species in those of both Asia and western America; and I next subjoin a partial list of such Asian species as accord perfectly with the type as to vegetative characters and a simple and terminal spike ; taking for their names under BISTORTA the same that have been already assigned them under *Polygonum* : B. BULBIFERA (Royle, Trans. Linn. Soc. xviii. 94), SPHAEROSTACHYA and STENOPHYLLA (Meisn. Monogr. 53, 52), CONFUSA (Meisn. in Wall. Pl. As. Rar. iii. 53), PERPUSILLA (Hook. f. Ic. Pl. t. 1490).

Also Asian, and of this genus as to habit and floral characters, but branched above and bearing several spikes: B. SPECIOSA (Meisn. Monogr. 66), AMPLEXICAULIS (Don. Prodr. 70) and OXYPHYLLA (Wall. Catal. n. 1715); and lastly two species of Asian mountains that are suffrutescent, bear graceful spikes of intensely red flowers, are hardy in England and highly ornamental under cultivation in Kew Gardens: B. AFFINIS (Don. l. c.) and VACCINIIFOLIA (Wall. l. c. n. 1695).

From *Bistorta*, the distribution of which is rather northern and subalpine, the transition to the almost subtropical genus TRACAULON is every way abrupt. No thoughtful and unbiased mind would be likely to regard the two groups of species as members of one and the same genus ; and in the early history of the typical species they were associated with *Fagopyrum* or else *Helxine* rather than with Polygonum ; so even with Linnæus at the first.

The characters of this genus are well brought out, though under the subgeneric name Echinocaulon, by Meisner, DC., Prodr. xiv. 131. Hasskarl appears to have made more than one attempt to obtain recognition for the group as a genus a little later than the date of Rafinesque's publication of the same opinion.

Only three species of TRACAULON have been credited to the United States; two of which are correctly presented by Mr. Small in his admirable book; but his *T. Beyrichianum* is doubtless a misapprehension. The real *T. Beyriehianum* is Brazilian and the plant of our southern borders fails in important points to answer the description of it. It is *P. multangulare*, H. & A. Comp. to Bot. Mag. ii. 62, and should be called T. MULTANGULARE.

Next of kin to our two familiar species of the Eastern and Southern United States are three North Asian which in their earlier history were confused with ours in nomenclature. They are T. SIBIRICUM—*P. sagittatum Sibiricum*, Meisn., T. SIEBOLDII (Meisn.) founded on *P. sagittatum* Thunb. and T. THUNBERGII (Sieb. & Zucc.) based on *P. arifolium* Thunb. Yet a fourth Japanese species is T. HASTATO-TRILOBUM (Meisn.), and even antipodal Australia and New Zealand have one which was at first confused with our *T. arifolium*. This is T. STRIGOSUM (R. Br.)

I subjoin a further list, far from complete, of TRACAULON species of various parts of the world, indicating where they were published under *Polygonum*: T. MEISNERIANUM (Ch. & Schl. Linnæa. iii. 40), RUBRICAULE and STELLIGERUM (Ch. Linnæa. viii. 130, 131), MURICATUM (Meisn. Monogr. 74), PERFOLIATUM (Linn. Sp. 2 ed. 521), PEDUNCULARE (Wall. Catal. n. 1718), PRÆTERMISSUM (Hook. f. Brit. Ind. v. 47), HISPIDULUM and TETRAGONUM (Blume, Bijdr. 535), MAACKIANUM (Regel, Fl. Ussur. 127).

More easily confused with *Polygonum*, and somewhat similar in aspect to such plants as *P. tenue*, is a small group of Californian annuals which the late Mr. Watson segregated under the subgeneric name of Duravia. But the characters of solitary

flowers, one only in the axil of each bract of the spike, the persistent styles, and, more important than all else, the absence of that articulation at base of the leaf-blade which marks *Polygonum*,—these are three generic characters, and I propose for the group generic rank under the name DURAVIA. The species as far as known have received specific names under *Polygonum* as follows: D. CALIFORNICA (Meisn. in DC., xiv. 100), BIDWELLIÆ, GREENEI (Wats. Am. Acad. xiv. 294, 295); of the same genus, apparently, is the large suffrutescent species D. BOLANDERI (Brewer ex Gray, Am. Acad. viii. 400).

For the small assemblage of the convolvulaceous Polygoneæ, long ago aptly denominated Climbing Buckwheat by country people—and surely less unreasonably reduced to *Fagopyrum* by pre-Linnæans, than to *Polygonum* by Linnæus—I indicated in the Flora Franciscana that the generic name is BILDERDYKIA, Dumortier.

I do not admire uncouth personal names in botany, and regret that *Tiniaria*, used by Mr. Small, has not priority.

Dumortier, whose Florula Belgica is very scarce—and as important for Polygoneæ in particular as it is rare—places these plants, where they truly seem to belong, next to *Fagopyrum*; and in his view the group has a better claim to the status of a genus, than either *Bistorta* or *Persicaria*, both of which remain with him but sections of *Polygonum*.

Two species, *B. Convolvulus* and *dumetorum* are named by him. Some of the others that go with them are B. SCANDENS (Linn. Sp. 522), CILINODIS (Michx. Fl. i. 241), CRISTATA (E. & G. Pl. Lindh, 51) and PTEROCARPA (Wall. Catal. n. 1690).

The Japanese *P. multiflorum*, commonly associated with the above I have not seen; but the description reads as if it might, perhaps, constitute a generic type.

During some sixteen centuries was PERSICARIA recognized universally as a genus distinct from *Polygonum*. Linnæus, the great father of confusion as to genera of plants, reduced the species to *Polygonum*; but ever since there has been a succession of authors who have protested against this, and reasserted PER-

SICARIA as a genus; though the Linnæan notion has still seemed to prevail, doubtless for the most as a mere prejudgment, during the nineteenth century.

Among earlier authors there are some who distinguished two genera, *Persicaria* with mild, and *Hydropiper* with pungent or peppery herbage; and the aquatic species were even again by some reckoned a distinct genus called *Potamogeton*. It is indeed almost certain that the real *Potamogeton* of ancient botany is *Persicaria amphibia;* and on this account Bubani, in the Flora Pyrenæa lately published, assigns the modern *Potamogeton* a new name. And so, it is a mistake on the part of Mr. Small in his new flora to have placed our native homologue of *P. amphibia* first in his list of the species, as if it were typical of *Persicaria;* for it is not. *P. maculosa*, for which Mr. Small has coined a new and duplicate binary, is the type of PERSICARIA.

The following members of the genus, formerly published by me under *Polygonum*, are here transferred: P. FUSIFORMIS (Eryth. i. 259), OMISSA, FALLAX, ARCUATA (Pitt. v. 200, 201).

Other North American species not hitherto transferred are P. CAREYI (Olney, R. I. Pl. 29), HARTWRIGHTII (Gray, Am. Acad. viii. 294), COCCINEA (Muhl. iu Willd. Enum. 428), RIGIDULA (Sheld. Minn. Studies, i. 14), LUDOVICIANA (Meisn. in DC., xiv. 116). This last Mr. Small may have failed to distinguish from *Persicaria segetum*, in the grammar of whose specific name he has also erred, supposing it to be an adjective, which it neither is nor can be made, except as *segtalis*.

In the group of species of which the Old World *Persicaria amphibia* is typical I have at intervals, as opportunity was given, during years pursued field studies, and made copious specimens, with a view of revising it, at least as it is represented in North America; and I have long enough deferred the placing upon public record of certain important biologic facts observed by me in relation to these plants.

All who have attained to even a superficial knowledge of their history are aware that the specific name *amphibia* was given to an Old World species because it was familiarly known to be amphibious, so to speak; one form, or variety, as they called it,

inhabiting ponds and lakes, the leafy part of the stem and also its leaves floating on the surface of the water, and another form growing on the ground, or at least on muddy shores, developing upright leafy stems, and exhibiting a very different foliage and inflorescence.

It was until somewhat recently understood that in various parts of North America we have the same *Polygonum amphibium* with its two very dissimilar varieties *aquaticum* and *terrestre*. There were early though unsuccessful protests against the doctrine that the European and American plants are specifically one; and latterly there has prevailed the view that the terrestrial plant is quite distinct, specifically, from the aquatic.

The view reached by myself after years of observation upon living plants both at the West and at the East is, that we have a number of distinct species that are normally aquatic, and as many more that are normally terrestrial; and that our aquatic species, at least in several instances, appear as riparian plants with wonderfully changed foliage and inflorescence, and that several of our normally terrestrial species do, under certain conditions, develop aquatic branches with floating foliage, this also strangely altered from that of the terrestrial type, yet at the same time most unlike that of the truly aquatic species in general.

I also suspect that some of the aquatic, or at all events some riparian species exist in even a third state, more strictly terrestrial, with a third set of strongly marked peculiarities of habit and foliage, and that in such third form the plants flower either very rarely or never at all.

If this judgment of mine as to the behaviour of the plants be well founded, it will follow that the delimitation of species will be most difficult, so long as a number of the species are known in only one of the three of their possible phases. Nevertheless, I am about to propose a very considerable number of new species; and shall found some upon the aquatic phase only, others some upon a riparian state only, as well as many more upon properly terrestrial plants. In the case of these last I am the less afraid of erring, knowing as I think I do, that these are more commonly of one phase only. But in the case of the

normally aquatic, I shall doubtless found aggregates; for I apprehend clearly the possibility, even the probability, that certain species which in their aquatic floating state present no characters upon which one may separate them, will in their riparian phases, when these are found, display their specific differences.

Here, then, is work for many a future generation of botanists, and most interesting work; but it must be begun in the field, and carried on there, patiently and persistently.

In the diagnoses that follow I decline to make any use or application of old varietal names, such as *terrestris*, *emersa*, *Muhlenbergii*, *natans*, and others. No one knows, and perhaps no one ever will know, just what the forms or states or phases were to which the authors applied the names; and to use them ignorantly of their first application is but to make confusion worse confounded.

It also seems necessary where aquatic, riparian and terrestrial phases of a species are known, to describe each in a separate paragraph, so very different are the characters of stem, leaf and inflorescence in the several phases. There is no other convenient way of making a full diagnosis of such species; for, as must be obvious to every one, these are states or phases, not varieties; so that to give them any kind of separate rank, or to assign them names as such would be to misrepresent the facts in the case, and therefore to be unscientific.

P. FLUITANS. *Polygonum fluitans*, Eaton in Eat. & Wright, 368. Aquatic. Stems very slender, the submerged internodes 3 to 6 inches long, the floating ones 1 to 1½ inches, exceeded by the remarkably slender petioles, these commonly 2 inches; leaf-blades elliptical to elliptic-oblong, 1½ to 4½ inches long, never subcordate, always tapering at base though abruptly spike solitary, short-cylindric, slender-peduncled: bracts broad-ovate, acute, glabrous.

Frequent in northern lakes from Maine and across Lower Canada to Wisconsin and south to New Jersey. Fernald's Aroostook Co., n. 95; a series of sheets from northern New York collected at various stations in 1879 and 1888 by L. F. Ward (these in U. S. Herb.), and some fine specimens taken by Mrs. C. F. Baker, at St. Croix Falls, Wisconsin, in 1899—all represent well this east-

ern plant for which so unhappy a misnomer as "*P. amphibium*, Linn." has hitherto prevailed. The plant of northern and middle western Europe has not only a lanceolate and subcordate foliage, but the margins of its leaves are keenly scabrous-serrulate. No such plant, or any presenting even a hint of these two excellent characters, has been found by me in the herbaria that I have consulted. It does not exist in North America. Muhlenberg and Willdenow a hundred years age made this out, and published either this or some other species as *P. coccineum*. Precisely what that was, however, as to the aquatic type, one can not now say. But Amos Eaton as early as 1840 gave the name *P. fluitans* to what, from the description as well as the locality, we must conclude to have been that here described anew. I do not know where that St. John's Lake is which Michaux cites as the habitat of his var. *natans;* but I suspect it to be some northern lake now known by another name, and lying within the habitat of *P. fluitans*, in which case that may be an older, though a merely varietal designation which would in my view be of no consequence.

It will devolve upon botanists resident in various parts of the extensive area occupied by *P. fluitans* to find, if it may be found, the riparian state. Unless it be a deep-water plant always, on some muddy shores will be found the emersed and creeping form; and it may be predicted that the leaves of such will have a lanceolate outline.

P. PURPURATA. Aquatic. Habit of *P. fluitans*, quite as slender, the internodes as long, but floating portion of stem with distinctly swollen nodes, and very short ocreæ: slender petioles 1 to 1½ inches long, oblong-elliptic blades 1½ to 4 inches, thin, purple-tinged, always acute at both ends, most so at apex: spike solitary, small-flowered, very dense, ovate, the pedicels spreading: achenes small, round-ovate, acute, dull blackish, neither quite smooth nor with a definable unevenness.

Riparian state. Stems mainly prostrate, rooting in mud, stout and fistulous, the internodes 3 or 4 inches long and cylindric: leaves lanceolate, very acute, 4 or 5 inches long beyond the short petioles, glabrous on both faces, only the reduced uppermost and floral muriculate-scabrous on midvein and margin: spikes

about 3, lanceolate, 1½ inches long on glandular-scabrous peduncles: bracts broadly ovate, acute, glabrous.

In the northern Sierra Nevada, California, Silver Lake, Lassen Co., 30 July, 1894, Baker and Nutting; both states at the same place and same date, and extremly dissimilar as to outline of leaves and characters of the spikes; yet both were distributed under my direction indiscriminately under the name of *Polygonum amphibium.* An excellent sheet of the riparian state was communicated to the U. S. Herb. and is the type of that part of the above diagnosis.

P. CANADENSIS. Riparian. The rather hard and wiry prostrate stems slender, with internodes of an inch or more: leaves lance-elliptic, 2 or 3 inches long on short not slender petioles, green and glabrous, on the petioles and basal part of some of the reduced floral ones scabrous-strigulose: spikes one or two, borne well above the foliage on a peduncle of 2 inches or more, of lanceolate outline and about 1¾ inches long, with commonly an isolated bract an inch below the spike subtending a glomerule of 3 or 4 flowers: bracts ovate, barely acutish: achenes round-ovate, black, highly polished yet very minutely shallow-pitted

Known to me only in a fine U. S. Herb. sheet collected at Galt, Ontario, 17 Aug., 1899, by L. M. Umbach, who reports it an inhabitant of small lakes. The stem is partly submersed, no doubt, but all the foliage present at flowering time, as well as the peculiar spikes and peduncles, are wholly aerial and not floating; whence I infer the specimens to be properly riparian. The habitat is entirely within the range of the aquatic *P. fluitans,* and the plant may possibly some day be shown to be the riparian state of that; but I think not.

P. MESOCHORA. Aquatic state. Larger and stouter than any of the foregoing; petioles as long but not slender; leaf-blades of another hue, being light-green, commonly 5 inches long and 1½ to 2 inches breadth, ovate to elliptic-lanceolate according as the base is broad and subcordate or somewhat tapering, glabrous, more or less puncticulate: spike solitary, rather long-peduncled, cylindric, 1 to 1½ inches long.

Riparian state. Stem stouter, the 3 or 4-inch-long internodes somewhat fistulous: leaf-blades broadly lanceolate, very acute,

rounded or truncate at base, the petioles 3 or 4 inches long, those of the uppermost showing some trace of hairs in the form of a diminutive muriculation: spikes commonly 2, strictly cylindric, longer and narrower than in the aquatic state.

This, as I apprehend it, is a northern midland homologue of *P. fluitans*, distinguishable in even its aquatic condition by the vivid green and the large dimensions of its leaves, as well as a different outline. The specimens are from the Upper Mississippi valley, from Indiana to Iowa and Minnesota. I am not without a fear that what I here describe is an aggregate, even as to the aquatic specimens. I therefore indicate as typical a sheet in the U. S. Herb. from Miller's, Indiana, 24 June, 1896, by L. M. Umbach. Beautiful Minnesota specimens, such as Ballard's, from Oshawa, Nicollet Co., Sandberg's, from Center City, and of Burglehaus from near Minneapolis all fail to exhibit the subcordate leaf-base. Yet, the riparian specimen, in which the subcordate character comes out strongly, is from Minnesota, at Fond du Lac, by F. F. Wood.

Similar plants from farther westward, like some from Nebraska, may or may not be of this species.

P. PLATTENSIS. Riparian. Leafy and floriferous terminal of stems assurgent, ½ foot high or more, the elongated and prostrate portions rooting in mud, and with internodes 4 to 7 inches long, each node often emitting a short sterile leafy upright branch, the leaves of such oval to lanceolate and 1 to 3 inches long, glabrous or pubescent; but foliage of main stem under the spike much longer, often 4 inches long, 1½ in. breadth, subcordately ovate-lanceolate, acute, bright green and glabrous, or more usually with a distinct pubescence along margin and midvein, the stoutish petioles an inch long or more: ocreae all thin and hyaline, glabrous: spikes cylindric, 2 inches long or somewhat less and narrow, their peduncles glandular-pubescent; bracts broad-ovate, scarcely acute, glabrous or with some short hairs toward the base.

Aquatic state (?). Floating leaves thin, oblong, obtuse at both ends, 2 or 3 inches long, glabrous: peduncle and bracts of the short oval spike also glabrous.

Riparian type from the North Platte River at Fairbanks in

southeastern Wyoming, July, 1894, A. Nelson. The description is drawn from two sheets in my herbarium, bearing the collector's numbers 479 and 551, a duplicate of n. 551 also in U. S. Herb. A fourth sheet I have seen in Herb. C. F. Baker, obtained by Mr. Nelson from ponds along the river at Dunn's Ranch, Albany Co., Wy., 16 July, 1900, and numbered 7598; this quite like the others except that it is glabrous altogether. Another specimen in Mr. Baker's herbarium, collected by himself at Fort Collins, Colorado, in 1894, has a scabrous peduncle and leaves marginally serrulate-scabrous without other pubescence, while one in Mr. Osterhout's collection from the same region is glabrous except as to the peduncle. Another Colorado specimen I have that was obtained by myself on Clear Creek, a tributary of the Platte, in 1870. But I do not feel very confident that all these are part and parcel of *P. Plattensis*; nor do I feel sure that the floating-leaved plant which I have appended as an aquatic phase of it really is such. This is Mr. Nelson's n. 7465 from Dunn's Ranch, July, 1900. Field study alone can enable one to decide.

P. SUBCORIACEA. Aquatic. Stems short, with internodes of of an inch long, apparently submersed in shallow water; floating leaves subcoriaceeus, oblong, obtuse at both ends, 2 to 2½ inches long, on firm petioles of ¾ inch: spike solitary, ovoid, hardly an inch long, on a stout peduncle of an inch or more: achenes small, round ovate, polished but with an obvious scarcely definable unevenness.

Riparian state. Foliage much larger, not as firm in texture, oblong-lanceolate, acute, subcordate, about 4 inches long and about 2 in breadth, on petioles of 2½ inches, both faces glabrous, but those smallest and near the spike distinctly though minutely scabrous-serrulate without trace of other pubescence: spike oblong, not longer than in the aquatic state but on a much longer and notably glandular-hispid peduncle.

This very satisfactory species rests at present on a single good sheet in U. S. Herb., from the North Fork of Laramie River, Wyoming, twelve miles from Laramie Peak, collected by Charles Schuchert, 24 Aug., 1899. The firmness of the foliage in the aquatic, and the serrulate margin of the uppermost riparian

leaves, as well as the hispid peduncle in this phase, separate the plant most definitely from its neighbor of a much lower altitude, *P. Plattensis*.

P. LÆTEVIRENS. Riparian. Prostrate rooting stems tortuous, short-jointed, the internodes little more than an inch long, more than half the nodes sending up a decumbent or upright densely leafy and terminally floriferous branch 6 to 10 inches high: leaves of a remarkably light and even yellowish green, elliptical to oblong-lanceolate, rarely more truly lanceolate and with broader and subcordate base, 2½ to 3½ inches long, on petioles of ½ to ¾ inch, glabrous on both faces but the margin varying from perfectly entire to scabrous-denticulate and even serrulate-ciliolate: spikes very short-peduncled, almost subsessile among the numerous leaves at summit of the branch, very short and thick, almost round-ovoid; bracts broad-ovate, cuspidately acute, glabrous.

This fine species well marked in habit, I know only in specimens distributed by Mr. Baker from near Gunnison, southern Colorado, 1891, his distribution number 806. The numerous very leafy stems, so crowded on the prostrate main stem, must appear in a singularly compact mass or bed.

P. PSYCHROPHILA. Aquatic, though apparently in shallow water, internodes about 2 inches long; leaves thin, oblong-lanceolate, acute, rounded at base but not subcordate, 3 or 4 inches long, glabrous, on not very slender petioles of about 2 inches: uppermost ocreæ (perhaps emersed) developing a broad green-herbaceous lobed and wavy rim: spike short-ovoid, less than an inch high, on a glabrous peduncle of less than an inch; bracts broad, pointless.

Seen only in the herbarium of Mr. Osterhout, who collects it in a subalpine lake in Estes Park in northern Colorado. The nature of the ocreæ would seem to indicate affinity for *P. Hartwrightii*, yet it is hardly of that group.

P. OREGANA. Riparian. Stoutish, short-jointed: lowest leaves (perhaps floating when young) oblong-lanceolate, subcordate, 3 or 4 inches long, on stout petioles of less than an inch, bright-green, glabrous; those above them smaller, oblong or elliptical, more or less villous or hirsute especially along the

midvein beneath and on the ocreæ: spikes very short and short-peduncled, ovoid, the peduncle slightly both pubescent and glandular; bracts ovate, obtuse, glabrous.

Tules of the Grand Rond Valley, eastern Oregon, W. C. Cusick, n. 1763 in my set and that of U. S. Herb. Quite similar, and perhaps specifically identical, is a plant from Lake Pend d'Oreille, Idaho, by A. A. Heller, 1892.

P. INSIGNIS. Aquatic, "growing in from 5 to 7 feet of water and floating on it," the stout stems with short internodes which, as to the lower and more deeply submerged are cylindrical, but nearer the summit swollen and fistulous: leaves floating, not large, 1½ to 2 inches long and from oval to elliptic-oblong, obtuse, often subcordate, the stoutish petioles about 2 inches long: peduncles very stout, 2 inches long, bearing the large spike an inch or more above the water, and this oval, 1 to 1¼ inches long, fully ¾ inch in diameter, the flowers therefore very large, the fruiting perianth nearly ¼ inch long, more than twice the length of the somewhat round-obvate shining achene, which nevertheless is not quite smooth, rather distinctly lineolate toward the base and obscurely scrobiculate in the middle.

In a lakelet at 9,550 feet on San Bernardino Mountain, southern California, W. G. Wright, no other data given on the two sheets in my herbarium except Mr. Wright's herbarium number 1809. The species is remarkable for the stoutness of its peduncles and the great size of its flowers and spikes.

Possibly Coville & Funston's n. 1584 may be referred here; but it is a smaller plant, with spikes and flowers not nearly as large.

Another aquatic form of Southern California is obtained by Mr. Parish at Aguanga, San Diego Co., and needs further field study. It can hardly prove to be *P. insignis*, however.

P. FISTULOSA. Riparian, evidently, though with the foliage and several slender spikes of the properly terrestrial species; decumbent and rooting part of stem of great size, internodes 5 or 6 inches long, ½ to ¾ inch thick, hollow, strongly and coarsely striate: leaves oblong-lanceolate and lanceolate, acuminate, 2 to 4 inches long, the lowest nearly glabrous, the

others roughened with minute short strigose hairs, the midvein beneath glabrous in the lower, appressed-muricate-roughened in the upper: upper part of stem and the peduncles glandular-scabrous; spikes 2 or 3 inches long, stout; bracts muricate-scabrous on the back, not ciliate; achenes polished, chestnut color.

Crater Lake, near Flagstaff, Arizona, Aug., 1884, J. G. Lemmon. Probably an aquatic of shallow water, becoming riparian. This is a mountaineer of northern Arizona; but more southerly stations, in the heated and half-desert regions yield other species, of terrestrial habitat, which probably do not connect with this.

A diligent study of much material from almost all parts of the United States, occurring in the herbaria under the name of *Polygonum Muhlenbergii*, more recently denominated *P. emersum*, has shown that this also is an aggregate of species, some of them strongly marked, others less so. They differ one from another markedly as to leaf outline and also as to the attitude of the foliage, the leaves in some spreading away from the stem almost divaricately, but in the greater number being ascending or suberect. As to the pubescence, they exhibit not only different degrees but different kinds of hairiness; and that of the midvein beneath invariably differs from that of the superficies of the leaf. In both the form and the indument of the bracts of the spikes one finds also another set of specific characters.

There are also several instances known to me by personal observation in which these species, normally of the land, do under conditions of accidental submersion of the stem, develop floating leaves, and those different not only from those of the terrestrial state, but also very different in general from those of species normally aquatic. Future observation will probably add much to our knowledge of such dimorphic eccentricities in the genus.

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I shall first give account of the few species that are marked by a narrow and spreading foliage. In this one particular they recall *P. Hartwrightii.* It has this same characteristic; but it has two other important peculiarities which these fail to exhibit. I shall indicate them later.

P. REMOTA. Stem rather slender, 1 to 2 feet long, decumbent, the nodes enlarged, internodes 1 to 2 inches long, glabrous, many-angled; leaves lanceolate, acute, about 6 inches long, thinnish, without obvious petiole and spreading away from the stem, glabrous above, except as to the midvein and veinlets, these all beset by a single series of short hair-points, lower face puncticulate, the broad midvein appressed-setose and the veinlets very minutely so; margin serrulate by appressed short hairs; ocreæ sparsely strigose, the hairs long, closely appressed; spikes linear, their peduncles sparsely hispidulous; bracts with scattered hairs on the back, not ciliate.

Westbrook, Maine, July, 1897, P. L. Richter, the type in U. S. Herb. Information as to habitat, always valuable, the collectors seldom give, much to the regret of those who study plants I have a suspicion that this plant is riparian, or else of swampy land.

P. NOVÆ ANGLIÆ. Apparently upright though slender, the internodes 2 to 4 inches long, strongly striate-angled, glabrous; leaves ascending rather than widely spreading, broadly lanceolate, 7 or 8 inches long, including the petiole (this 1 inch or more), thin, glabrous but puncticulate, the midvein beset with an appressed murication especially beneath, the whole margin sharply serrulate-scabrous with well developed and closely set but short setiform hairs; spike large, linear, more than 3 inches long, its peduncle glandular-hispidulous; bracts small, nearly or quite glabrous, or perhaps sometimes quite strigose-hairy.

South Hadley, Massachusetts, A. C. Cook, 1887, the type in U. S. Herb., where also exist some mere fragments by Oakes from Wenham Pond in the same State, which may or may not belong here. Only a floral leaf is shown in the fragments, and the veins of these develop something more like a hairiness.

P. LAURINA. Of the size and the slender decumbent habit of *P. remota*, but leaves elliptic-lanceolate and about 7 inches long including the ½ inch petiole, thin, sparsely and minutely strigose on both faces, more pronouncedly and densely so on the midvein, especially beneath; ocreæ, as also the lower internodes of the stem, sparsely appressed-hairy; spikes very slender, 1 to 2 inches long, on slender glandular-hirtellous peduncles; bracts rhombic-ovate, hairy, not ciliate.

Catawba Island, in Lake Erie, northern Ohio, 5 Sept., 1897, E. L. Mosely; the type specimens in U. S. Herb. Leaves with the outline and venation of those of *Laurus nobilis*.

P. PORTERI. Decumbent, or the basal part prostrate, the stem 2 feet long, very densely leafy with an elongated and spreading foliage; lower internodes 2, upper 1 inch long, all striate-angled and more or less appressed-hairy; subsessile leaves 5 to 7 inches long, lanceolate, acute, sparsely scabrous above both on the veins and elsewhere, especially toward the margin, this beset with long stout but appressed cilii, beneath sparsely hairy, but the hairs of the midvein much longer, setiform, appressed; ocreæ somewhat villous-hirsute; spikes linear, 1 to 2 inches long, their peduncles glandular-hispid; bracts ovate, acute, sparsely strigose on the back and bordered with long bristly cilii.

Shores of the Delaware River at Easton, Penn., 20 Aug., 1895. T. C. Porter, type in U. S. Herb. Evidently riparian, but surely no mere phase of the next, from which the long narrow subsessile spreading foliage must widely separate it.

P. COCCINEA (Muhl.), Greene, Leafl. i. 24. Commonly upright, about 2 feet high, copiously leafy with petiolate and ascending foliage; blades ovate-elliptic or elliptic-lanceolate, 5 to 8 inches long, abruptly acuminate, the upper face muriculate-scabrous on midvein and all veinlets, the lower more emphatically so, the margin minutely serrulate-scabrous, the general surface nearly or quite glabrous; ocreæ very thin, sparingly strigulose-roughened with short sharp hairs: spikes 1½ to 3 inches long on short glandular-hispidulous peduncles; bracts with scattered short spinulose hairs on the back and along the margin.

Riparian state. Assurgent stem less than a foot high from a prostrate basal portion rooting at the nodes: leaves smaller and relatively narrower, truly lanceolate, the leaf-surface quite strigose and veins also strigose rather than muriculate: spikes slender; bracts as in the normal state.

Specimens of the terrestrial form described above have been somewhat copiously distributed from Pennsylvania, the habitat of Muhlenburg's *P. coccineum* with which this plant must doubtless be identified. In the U. S. Herb. exists a very good sheet obtained at Lily Lake, Luzerne Co., in 1889, by Mr. Small; also two by Mr. Heller, both from Lancaster Co., in 1889 and 1891. Plants exactly like these are in hand from the District of Columbia, by L. F. Ward, in 1877, and from the banks of the Ohio in Wood County, West Virginia, 1897, by W. M. Pollock. It is scarcely to be doubted that Michaux's var. *emersum* is the same.

The riparian, or perpaps rather the subaquatic state which I venture to refer here, though possibly erroneously, is from Ithaca, New York, no collector's name being given.

There is another plant, of the size and habit of the above which I dare only designate as a variety of *P. coccinea*, which I may call

Var. ASPRELLA. Rather larger than the type, especially as to foliage; both faces of the leaf roughened with a minute though not sparse strigulose hairiness, the veins and veinlets rough with an appressed bristly hairiness instead of being merely muricate-scabrous; bracts of the spike strigose on the back, and usually ciliate with longer hairs.

The best specimens of this marked variety are from Jackson City, near Washington, D. C., by Mr. E. S. Steele, Aug., 1897; and Dr. Britton has distributed nearly the same from Staten Island, N. Y.

P. PRATINCOLA. Size, habit and general outline of foliage as in the last, but pubescence more dense, that of the midvein also, of very different character, being long, very straight and closely appressed; spikes not large, also short-peduncled, surpassed by the subtending foliage: peduncles glandular-hispidulous; bracts of the spike elongated-deltoid, rather densely strigose and without obvious ciliation.

A rank weedy species of low prairies in Indiana, Illinois, Iowa and Missouri, probably also in Michigan, Wisconsin and Minnesota; notably leafy and small-flowered as compared with its eastern homologue, and by these notes, and especially by the very dissimilar pubescence of the veins beneath, easily distinguished.

P. SPECTABILIS. Size of the foregoing; leaves more elliptic-lanceolate, of firmer texture, glabrous on both faces except the veins and veinlets, these both above and beneath beset with minute slender conic and appressed short hairs, the margins appressed ciliate with longer hairs: spikes usually two, large and showy, the terminal one 2 to 4½ inches long, the other half as long; short peduncles minutely glandular-hispid, but the whole stem quite glabrous; bracts merely hispidulous and sparsely so: achenes round-ovate, bluntly short-apiculate, dark-brown and shining.

Handsome species, known to me only as in U. S. Herb., in specimens by M. S. Bebb from Fountaindale, Ill., and from Riley County, Kansas, by G. L. Clothier.

P. LONCHOPHYLLA. Leafy stem upright, or perhaps only assurgent from a decumbent or prostrate base rooting at the nodes: leaves narrowly lanceolate, 4 or 5 inches long, ascending on petioles of less than an inch, those from the lower nodes merely scabrous above, the upper and floral strigulose above, the surface beneath similarly pubescent, but the midvein more densely so, and with longer and more bristly but closely-appressed hairs; spikes about 2 inches long, linear, their peduncles neither glandular nor scabrous, but clothed with a short soft appressed though not dense pubescence; bracts ovate, acute, strigose on the back with short hairs, and ciliate with longer and stouter ones.

Near the southern shore of Lake Michigan, at Miller, Ind., 7 July, 1897, collected and distributed for *P. Hartwrightii*, by L. M. Umbach; but the plant bears no particularly close relationship to that species.

P. GRANDIFOLIA. Terrestrial state 2 or 3 feet high, slender, very leafy to the summit, the nodes abruptly swollen, the inter-

nodes about 2 inches long; leaves 5 to 8 inches long including the ¾-inch petiole, the blades exactly elliptical as to general outline, but the narrow base subcordate, the apex acuminate, vivid though deep green above, and glabrous except a single series of minute hair-points along midvein and veinlets, beneath sparsely short-hairy everywhere, but the hairs of the midvein stouter and closely appressed, those of the veinlets more spreading, the margin also beset with longer stiffer but closely appressed hairs.

Aquatic state. Internodes longer and stem stouter, rooting at the nodes though floating: leaves cordate-oblong, 4 to 6 inches long, the largest 3 inches broad, all acute, but with broad cordate base and on stout petioles of 3 or 4 inches, in every part glabrous.

This plant is doubtless common on moist or wet wooded bottoms and shady banks of the upper Mississippi between Iowa and Minnesota and Wisconsin, where at various places I have seen it, though never in flower. My type specimens were taken near LaCrosse, 9 July, 1898, from a colony of plants growing on a stone embankment, and near the water's edge. The sheets before me are three, one showing the terrestrial state, and two the floating-aquatic condition. The three specimens are from one and the same main stem; parts of one plant!

P. VESTITA. Stoutish, ascending, 2 feet high: leaves ovate-lanceolate and lanceolate, acute or acuminate, subcordate at base, 4 to 6 inches long on stout suberect petioles of about 2 inches, both faces canescent with a dense short strigose pubescence, that of the midvein beneath longer than that of the surface but equally slender and closely appressed; ocreæ more canescent than the leaves and with a similar hairiness; internodes sparsely strigose: flowers rather small, in spikes 1½ to 3 inches long borne scarcely above the leaves on somewhat shorter stout glandular-hispid peduncles; bracts with back and margin loosely long-hairy.

Next of kin to *P. pratincola*, but of more westerly range, and easily distinguished by its smaller stature and dense almost silvery indument. The best specimen seen is one made by my-

self more than forty years since, taken from the margin of a shallow pond near Albion, Dane Co., Wisconsin. It ranges westward into Nebraska, where Mr. Rydberg's n. 1822 (as in U. S. Herb.) well represents it and Mr. Clements' n. 2925, from an intermediate station, still in Nebraska, may be referred here, though less canescently pubescent, and with leaves not at all subcordate.

P. PROPINQUA. Near the last, more nearly aquatic and decumbent, only the growing foliage canescent, and that almost silvery; lower and mature leaves elliptic-lanceolate, not subcordate, rather acutish at base, 4 or 5 inches long, obscurely and minutely strigulose-roughened on both faces, but the midvein beneath beset with a stout but sharply hair-pointed muriculation rather than pubescence, neither the ocreæ nor the stem obviously pubescent: spikes thicker, and flowers larger than in the last; peduncles merely glandular-scabrous; bracts from scabro-hispid to rather obviously strigose.

Species known only from South Dakota, Rydberg's n. 986 (in U. S. Herb.) from the Black Hills, being the type; a more pubescent form having been collected by T. A. Williams at Brookings, in 1889.

P. RIGIDULA (Sheld.), Greene, Leafl. i, 24. Aquatic but rigidly erect, without floating leaves, 3 to 6 feet high; immersed internodes thick and fistulous, tapering upward from each node: leaves about 5 to 7 inches long on ascending petioles of about 3 inches, triangular-lanceolate, slenderly tapering above, broad and nearly truncate at base, glabrous on both faces, the reduced floral or uppermost finely strigulose and puncticulate; peduncles about 2 inches long, glandular-hispidulous, spikes rather longer, thick and large-flowered; bracts ovate, sparingly somewhat glandular-hispidulous: achenes orbicular, smooth, polished.

Certainly very distinct, as Mr. Sheldon has demonstrated, the leaf-outline being altogether peculiar, as also the fistulous and somewhat conical internodes of the submersed parts of the stem. The above diagnosis is based on a fine sheet of Ballard's collecting at Nicollet, cited by Mr. Sheldon. But according to U. S. Herb. the species ranges westward to the vicinity of Bozeman,

Montana, where it was obtained by Mr. Knowlton in 1887. And there is a sheet from the Little Missouri Buttes in western Dakota, in the herbarium of the late T. A. Williams; these specimens small, only a foot high, but they have the essential characters of the species.

P. PLANTAGINEA. Aquatic in shallow water, the stems only 5 to 8 inches high: leaves not floating (unless the very earliest) but polished and glabrous, very large for the plant, the blades mostly 4 or 5 inches long, subcordate-lanceolate, merely acute not acuminate, ascending on stout petioles of an inch or more, the margins often serrulate-scabrous or at least scabrous-denticulate, some small leaves under the spikes showing a strigulose pubescence, the foliage otherwise glabrous; spikes slender and elongated, 2 or 3 inches long, on stout glabrous peduncles quite as long; bracts rhombic-ovate, glabrous.

Remarkable aquatic plant with leaves even rough-margined after the manner of Old World *P. amphibia*, but spikes as long and slender as those of *Plantago major*. The type specimens are on two sheets in U. S. Herb., collected in 1887 and 1888, from along Little Cedar River in the northern part of Iowa, by Mr. G. Holzinger, and were deposited in the herbarium where I find them by Prof. J. M. Holzinger.

Its locality would be an interesting one for field study, with a view of investigating the plant's possible relationship to some terrestrial form.

P. WARDII. Aquatic in shallow water, without floating leaves, the rather slender copiously leafy stems 2 feet high or more, glabrous; leaves elliptic-lanceolate, with tapering base, or more precisely lanceolate with subtruncate but still rather narrow base, 3 to 6 inches long, acuminate, green, but not quite glabrous, a lens disclosing a minute and sparse short-hairiness on both faces, the midvein beneath clothed densely with very fine appressed hairs from a stout pustular base; peduncles short, rough with short strongly gland-tipped hairs; spikes 2 or 3 inches long; bracts ovate, acute, lightly strigose and with a stronger set of marginal hairs.

Plains of Colorado near the base of the mountains, probably

in pools along the Platte, near Denver, August, 1881, L. F. Ward, and at New Windsor, Weld Co., 31 July, 1894, Geo. E. Osterhout.

P. OTOPHYLLA. Evidently 2 or 3 feet high, suberect, slightly flexuous; very short-peduncled but ample leaves elliptic-lanceolate, abruptly acuminate, the narrow base subauriculately rounded at the insertion of the petiole, the largest 5 or 6 inches long, 2 in width, deep green above and scarcely roughened by the faint though not very sparse minute strigose hairiness, beneath paler, inconspicuously strigose with longer softer hairs, the midvein conspicuously clothed with very long comparatively soft hairs that are rather ascending than appressed; both the short thin ocræ and the striate internodes pubescent with very straight and closely appressed hairs; short peduncle similarly appressed-pubescent and not glandular: bracts of the short spike long-hairy both on the back and along the margin; flowers small for the plant.

In swamps at Dallas, Texas, 11 Oct, 1900, J. Reverchon, distributed by B. F. Bush, to U. S. Herb., under n. 2146. Species particularly well marked by the long-soft hairiness of the midvein of the leaf beneath.

P. ABORIGINUM. Of the size of the last, rather more slender, the geniculate stems more or less decumbent; leaves narrower, exactly lanceolate, though with subcordate or subauriculate base, rather obviously soft-strigose above, more densely and silkily so beneath, where the midvein is clothed with very straight and closely appressed long fine hairs: peduncles rather densely appressed-villous without glands; spike short, not surpassing the leaves; bracts villous-strigose: flowers small; small chestnut-brown achenes orbicular and little compressed, almost aphæroidal.

Species of Oklahoma and the Indian Territory, collected by Mr. Blankinship, 28 Aug., 1895.

P. LANGLOISII. Evidently upright, several feet high. the comparatively slender stems with notably short and thick nodes, the striate internodes 1½ to 2 inches long; leaf blades elliptic-

lanceolate, acuminate, 5 to 8 inches long, 1½ to 2 inches broad, spreading, sparsely scaberulous above, the lower face, and especially the midvein, rough with short rigid acute closely appressed hairs; petioles an inch long or more; sheaths clothed with long closely appressed bristly hairs, the summit somewhat lacerate and bristly-ciliate: spikes several, long, linear, somewhat drooping: achenes thick-lenticular, not highly polished but rather dull blackish.

Swamps along the Mississippi near its mouth in extreme southern Louisiana, 18 July, 1885, Rev. A. B. Langlois. A tall and rank member of this group, with long, half-drooping spikes. Aquatic and floating form to be sought.

P. Cusickii. Rather slender upright amply leafy stems two feet high or more from a prostrate and submersed rooting portion quite as slender, both the submersed and aerial internodes about 3 inches long, the aerial nodes abruptly swollen and the whole stem strongly striate, glabrous: blades of the short-petioled and spreading leaves 5 to 8 inches long, oblong-lanceolate, acuminate, thin, slightly undulate, inconspicuously and finely appressed-pubescent on both faces, only the stout closely appressed hairs of the midvein beneath with a thick base: ocreæ hyaline, clothed with long soft appressed hairs; peduncles glandular-hispid, 2½ inches long, the cylindric spikes narrow and about as long, the whole not equalling the upper leaves; bracts with long appressed dorsal and margined hairs, and some shorter gland-tipped ones at base.

Tules of the Grand Rond Valley, eastern Oregon, Aug., 1897, W. C. Cusick; the type in my herbarium under the collector's n. 1764. Evidently here, as in the case of *P. rigidula* of the upper Missouri region, we have a species truly aquatic, as to the basal parts and the roots, but with still the habit, foliage, and inflorescence of the strictly terrestrial species.

I refer to *P. Cusickii* various sheets collected in eastern Oregon, Washington, and Idaho, by Suksdorf, Leiberg, Sandberg, Elmer and others.

P. Franciscana. Terrestrial state erect, densely leafy, 2 feet high, the nodes not swollen, internodes about 2 inches long,

glabrous, but the thin ocreæ appressed-villous, narrow, an inch long or more and longer than the short petioles; leaf-blades elliptic-lanceolate, acute, but scarcely acuminate, 5 or 6 inches long, the very lowest glabrous on both faces, the others rather densely but finely strigulose, the midvein beneath with longer stouter hairs gradually thickened from midway down to the base; very short peduncles copiously glandular-hispidulous with some long bristly hairs intermixed; spikes short and stout, barely 2 inches long, nearly ½ inch thick; bracts not strongly strigose-hairy.

Aquatic state. Floating leaves long-stalked, the blade of a broad subcordate-lanceolate cut, merely acute, quite glabrous on both faces, upper leaves smaller, more lanceolate, not subcordate, the uppermost with traces of the pubescence of the terrestrial state; spikes long-stalked but otherwise as in the other state, save that both peduncle and bracts are glabrous.

Local, as far as known, at Mountain Lake, a small pond in front of the U. S. Marine Hospital, San Francisco, where I several times collected the land form from 1888 forward. I never observed it as an aquatic with glabrous floating foliage; but the types of this state were obtained from the lake by my pupils Michener and Bioletti, in June, 1891.

P. HESPERIA. Riparian, the slender stems 2 feet high from prostrate rootstocks inhabiting lake-shore mud, and forming dense colonies; herbage firm, light-green, apparently glabrous, the stem all the lower leaves truly so, except as to the leaf margins, these closely and evenly spinulose-serrulate; petioles of these 2 or 3 inches long, the broadly lanceolate merely acute blades only 4 or 5 inches; reduced uppermost leaves with a single series of hair-points along all veinlets and abundant short appressed thick-based very firm-pointed hairs; short peduncles glandular-hispidulous, as also the bracts of the stout cylindric 2-3-inch-long spikes.

Margin of a lake near Searsville, San Mateo Co., California, 20 Oct., 1902, C. F. Baker, who distributes it under n. 1835. An exceedingly beautiful species by the contrasted vivid green

of its firm foliage, and the rich rose-red of its dense spikes. A specimen of what seems quite the same is in U. S. Herb., as collected at some unrecorded station in California by Bridges.

P. ALISMÆFOLIA. Riparian, but doubtless an aquatic at early stages and with some leaves floating; herbage of the same vivid green as the last, but leaves much larger, the blades of the lowest 6 inches long, 2½ in breadth, cordate at base, merely acute at apex, perfectly glabrous even marginally, the reduced uppermost sparsely appressed-silky, the indument of the midvein longer but firm and soft throughout, closely appressed; peduncle strigulose, scarcely glandular: bracts of the 2-inch-long small-flowered spike ovate-lanceolate, glabrous or nearly so.

On Russian River north of Cloverdale, Calif., 8 July, 1902, A. A. Heller, being n. 5823 of his distribution as represented in U. S. Herb. I had hoped to make this out to be a probable aquatic state of *P. hesperia*, but the difference as to leaf-margins, and the pubescence of the pubescent parts of the foliage in the two are radically dissimilar.

P. COVILLEI. Stout, erect, several feet high, leafy with large lanceolate acuminate leaves ascending on short stout petioles of an inch or even less; blades of all but the uppermost 6 to 8 inches long, nearly 2 inches wide, slightly canescent on both faces with fine appressed often tortuous hairs, the midvein beneath beset with stouter appressed hairs bristly above a tubercular base: peduncles beset with very slender gland-tipped hairs; spikes 2 to 3½ inches long, their bracts canescently strigulose and with some short gland-tipped hairs intermixed; rounded achenes slightly obovate.

Near Visalia, Calif., Coville & Funston, n. 1266 of the Death Valley Exp., and there are older specimens in U. S. Herb., one obtained by Newberry on Williamson's Exp., the other taken on the Wilkes' Exp., both from the Sacramento Valley.

P. OPHIOPHILA. Evidently riparian and more or less decumbent as to the leafy and floriferous stems, these a foot high; leaves of unusually firm texture, the lowest somewhat triangular-lanceolate, with a subtruncate base and a long stout ascending petiole of 2 inches, the blades 4 or 5 inches, glabrous, or

with traces of muriate-scabrous hair-points on the veinlets and near the margin, those next above closely muricate-scabrous both superficially and on the midvein as well as veinlets, the others narrower and elliptic-lanceolate, more taper-pointed, somewhat, silvery-strigulose on both faces, the midvein beneath with coarser and even slender-conical appressed hairs: peduncles 2 inches long, sparsely beset with ascending short gland-tipped hairs: spikes remarkably narrow, 3 or 4 inches long, the flowers small; bracts canescently strigose, not ciliate: achenes round-ovate, unusually thin and compressed, not highly polished, of a light chestnut-brown.

Rattlesnake Tanks, Arizona, 1 Aug., 1891, D. T. McDougal, in U. S. Herb. Remarkable for long and slender small-flowered spikes, with canescent bracts.

P. Rothrockii. Rather slender, erect, very leafy with a short-petioled ascending thin and taper-pointed foliage; the internodes and even the ocreæ glabrous: leaves of lanceolate outline but slender-pointed, above either glabrous or with scattered and inconspicuous hair-points, especially on the veinlets, beneath less roughened superficially but more so on the unusually prominent veinlets, the hair-points of the midvein subulate-spinulose, appressed: spikes and glandular-scabrous peduncles both short, little exceeding the leaves; bracts of the short cylindric spike spinulose-ciliolate and with scattered hair-points on the back.

Shores of ponds, streams and ditches of the hot and arid regions along the Mexican boundary; good type-specimens being Rothrock's n. 670 (as in U. S. Herb.); Toumey's "*Polygonum incarnatum*, Ell." from along an irrigating ditch at Tucson; a sheet by Dr. Palmer from "Arizona, 1869"; while for older and more classic but poor material one may cite Charles Wright's n. 1779, besides a couple of fragments in U. S. Herb. from the Mexican Boundary Survey, these mounted on a sheet with a larger specimen of another species, all under n. 1184.

In a general way unlike the foregoing group in habit, being of lower stature, denser leafiness, with usually subsessile and spreading leaves, is an aggregate which has passed under the

name of *Polygonum Hartwrightii;* most of the species exhibiting salverform ocreæ, this organ consisting of the usual thin sheath surmounted by a distinct herbaceous spreading border. The type of this group bears the marks subjoined.

P. Hartwrightii (Gray), Greene, Leafl. i. 24. Low densely leafy stems with short internodes of less than in inch, naked for one-third their length, otherwise invested by the ocreæ, these appressed-bristly-hairy, the limb bristly-ciliate; leaves oblong to oblong-lanceolate, 3½ to 5 inches long, acutish at both ends, glabrous above, or with a few hair-points toward the minutely spinulose-serrulate margin, beneath glabrous except some scattered spinulose hairs along the midvein; both peduncle and bracts of the oval spike minutely and sparsely hirtellous.

Original specimens from Penn Yan, N. Y., by Dr. Wright, justify the above diagnosis. Quite the same has been distributed from Pownal, Vt., by Mr. Eggleston, and from near Lake Grinnell, N. J., by Porter & Britton.

P. abscissa. Size and habit of *P. Hartwrightii,* with similar leaf-outline but leaves more spreading, their pubescence very different, upper face sparsely strigose, the hairs more copious along midvein and veinlets, marginal hairiness strong but appressed, midvein and veinlets beneath either merely muricate-scabrous or the murications bearing each a long hair: ocreæ short, thin, almost hyaline, terminating very obliquely and with no trace of herbaceous border; peduncles of the oval spikes short, stout, hirtellous; bracts also strigose or hirtellous.

Chelmsford, Massachusetts, 20 Sept., 1885, C. W. Swan, in my herbarium, labelled *P. Hartwrightii* and imitating that, but differing from it entirely as to nature of pubescence, as well as by the oblique wholly sheathing ocreæ.

P. asclepiadea. Terrestrial state; flowers unknown. Stout, decumbent, the several tufted stems a foot long, densely leafy; nodes not swollen, internodes only ¾ inch long, completely invested by the cylindric striate hirsute sheaths, these all with a very broad spreading foliaceous erose and hirsute-ciliate border; leaves apparently sessile, the petioles not produced, lanceolate, acute, 3 inches long, glabrous on both faces, only the midvein

beneath and the margins with some scattered bristly hairs; foliage widely spreading.

Riparian state ? (provisionally *P. Nebrascensis*). Leaves ascending, more remote, distinctly short-petioled, the internodes twice the length of the sheaths, the rim of the latter quite narrow; peduncle of the short oblong spike with a few delicate gland-tipped hairs, bracts thinly somewhat hirsute-hairy.

The terrestrial type is known to me only as collected by myself on the open prairie at Prairie Junction in southeastern Minnesota, 7 July, 1898. It is exceedingly well marked in habit and foliage, much resembling some alternate-leaved asclepiads. The riparian plant, very likely distinct, is typified in Mr. Rydbergs' n. 1649 from central Nebraska, as in U. S. Herb.

P. AMMOPHILA. Terrestrial, and even of rather dry sandy soil. Decumbent stems a foot or two long in fertile plants and loosely leafy, lower, with short internodes and a dense leafiness in the sterile state: leaves lanceolate, 3 to 5 inches long, acute, only the uppermost with midvein hirsute beneath, this in the lowest quite glabrous and the leaf-surface scarcely roughened with scattered hair-points, ocreæ with very thin villous sheath and broad toothed and bristly-ciliate border: spikes mostly 2, oblong, their peduncles beset with a few short gland-tipped hairs and fewer long bristly ones; bracts hirsute-ciliate, otherwise nearly glabrous: achenes small, somewhat obovate, black and shining.

The fertile type of this has been sent me by Mr. Holzinger from Winona, Minn., where he collects it on high sandy banks of the Mississippi. Sterile specimens were taken by myself on dry sandy banks of the same river, at LaCrosse, Wis., 8 July, 1898.

P. MURICULATA. Stout, decumbent, the somewhat branching stems 2 feet long, densely leafy, with a foliage at length widely spreading, the internodes barely an inch long and nodes swollen: leaves elliptic-lanceolate, 4 or 5 inches long including the short stout petiole, merely acutish at both ends, sparsely scabrous and strigose above, marginally short-ciliate with appressed setose

hairs, glabrous beneath except as to the strongly muricate midvein; ocreæ also muricate and more or less hirsute, the very broad herbaceous border crisped and setose-hairy; peduncle of the short thick cylindric spike glabrous, sharply many-angled; flowers pale, merely pink.

Near New Windsor, Colorado, 26 July, 1901, Geo. E. Osterhout, the type in his herbarium. A luxuriant ally of *P. Hartwrightii;* leafy but sterile branches overtopping the solitary spikes.

P. HOMALOSTACHYA. Aquatic state seen only in shallow water, with stems barely a foot long; nodes not swollen, internodes 1 to 2 inches long: leaves thin, oblong-elliptic, 2 to 3½ inches long, on petioles of an inch, acute or obtuse, the base rarely subcordate; ocreæ hyaline, without border: spikes commonly 2, short-peduncled, oval or oblong, narrowly cylindric.

Moist-land state much larger, often 2 feet high, copiously leafy, the leaves from elliptic to lanceolate, the largest and elliptic 4½ inches long, 1¾ in breadth, commonly glabrous on both faces, the more lanceolate often 5½ inches long, sparsely rough-hairy above, more densely so beneath; the midvein distinctly and harshly hirsutulous, all short-petioled, the ocreæ scaberulous, ending in a broad lobed and crenate as well as hirsute-ciliate herbaceous rim: spikes quite as in the aquatic state, never elongated and linear, short-peduncled, never even nearly equalling the foliage.

Sterile dry-land state a foot high, decumbent, densely leafy, much more strongly pubescent, the elliptic-lanceolate subsessile ascending leaves 2 to 5 inches long, rather bright-green but scabrous-strigose on both faces, the midvein beneath sparsely but stiffly hirsute, with slightly retrorse hairs; ocreæ very hirsute, their broad rim as in the floriferous terrestrial state.

The type specimens of this fine species consist of seven mounted sheets collected by myself in and around a large shallow lake near Perry's in Pine Valley between Palisade and Eureka, Nevada, 25 July, 1896. Different though the three distinct phases of this appear, both as growing, and as mounted in the herbarium, my types in two instances show the aquatic

and almost floating branch, and the riparian firm and leafy one growing from the same half-submersed and half-emersed prostrate main stem.

From other parts of Nevada, and from Utah, material mostly fragmentary exists in the herbaria under the name of *P. Hartwrightii*, a part of which seems referable to the present species.

P. VILLOSULA. Riparian or subaquatic, a foot high, with oblong-lanceolate acutish 5-inch-long lower leaves glabrous throughout and probably at first floating, though short-petioled; the upper nearly as large, far surpassing the flowers, oblong obtuse, with subcordate base, sparsely and rather softly hairy on both faces, the midvein beneath hirsute with long spreading hairs; ocreæ, petioles, even the upper part of the stem villous-hirsute, not glandular; spikes small, oval; bracts hirsute.

Granite Station, Kootenai Co., Idaho, 30 July, 1892, J. H. Sandberg, in U. S. Herb. under the collector's n. 807. The herbaceous border of the ocreæ present but narrow.

P. CHELANICA. Riparian, with the subsessile spreading foliage of *P. Hartwrightii* but destitute of the herbaceous rim: leaves small, the largest 3 or 4 inches long, lanceolate, subcordate, very short-petioled, not canescent though sparsely and finely strigulose on both faces, the midvein beneath clothed with coarser straight appressed hairs, these short, not thickened at base; ocreæ more densely and coarsely strigose; peduncle glandular-hispidulous, about 1 inch long, the narrow and linear spike somewhat longer; bracts sparsely bristly-ciliate and with a few short bristly hairs on the back.

On sandy bars along Lake Chelan, Washington, July, 1897, A. D. E. Elmer, n. 857 as in U. S. Herb., named *P. Hartwrightii*, but its relationship to that species not is manifest.

P. GRANDIFOLIA, Greene, Leafl. i. 37. Without the least knowledge of its inflorescence or flowers, and upon characters of foliage and pubescence, I published this with the fullest confidence in its validity as a species. And now, from only a short distance above La Crosse, the station for my sterile type spec-

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imens, namely, from the shores of the Mississippi at Winona, Minnesota, I have the aquatic state in flower, communicated by Professor Holzinger of the State Normal School at that place, who collected it in 1897. The leaves, evidently floating, at least the lowest, are not quite as large as in my specimens, but are as perfectly glabrous, only the margins being either merely scabrous-serrulate, or with the hair-points developed into what approaches the spinulose-serrulate. The spikes are linear and about 2 inches long, of a rich rose red; the bracts uncommonly long-pointed, cuspidately however rather than acuminately, the very apex being blunt. The peduncles are slender, and very delicately glandular-hirtellous. The specimens give no hint of any close affinity for that other long-spiked aquatic of northern Iowa, *P. plantaginea.*

The Neckerian Cactaceous Genera.

In this exclusively American family of plants at least five of the genera now everywhere recognized as such are pre-Linnæan. *Melocactus*, *Cereus*, *Opuntia*, *Phyllanthus*, and *Peireskia* had all been published anteriorly to the year 1753, in which year Linnæus reduces them all to one genus, assigning it a new name, *Cactus.* Moreover, among the twenty-two so-called species enumerated in the Species Plantarum of that date are the types of four other genera now everywhere accepted as such, namely, *Mamillaria*, *Pilocereus*, *Nopalia* and *Phyllocactus.*

Thus the types of nine distinct genera, as men now perceive, were embraced within the *Cactus* of Linnæus.

There were two botanists of the time who entered each his own protest against this jumbling together of incongruities, Adanson and Miller. The former of these did not so greatly improve the situation, distributing as he did all the Linnæan species between the two pre-Linnæan genera, *Opuntia* and *Cereus*; though on an excellent type which Linnæus had ignored, he proposed a new genus *Hariota*, the equivalent, I think, of the more recent *Rhipsalis.* It is also to be noted that he rejected as being the mere synonym that it truly is, the Linnæan *Cactus.*

Miller, at almost the same time, in preparing a new edition of his Dictionary restored two more of the pre-Linnæan genera, setting forth in that rank, *Cereus, Opuntia, Peireskia* and *Melocactus,* but to this last he assigned the Linnæan synonym of *Cactus*; perhaps wishing to conciliate, by a mere name, the popular botanist whose system of cactaceous plants he had so boldly revised.

Some twenty years or more after Miller's restoration of the old genera, Necker went over the ground in his own peculiar fashion, reaffirming that in the Cactus of Linnæus there are four distinct genera; and there is reason to think that this was an independent proposition of his own, not suggested by Miller, whose Gardener's Dictionary he may not have seen. At all events, to three of his four proposed genera of cactaceous plants he assigns names so entirely new and strange, that they can not be identified at a glance and by name with the old genera, and a critical study of his diagnoses becomes necessary to the determination of his types.

Comparing his descriptions one with another, we ascertain readily that the author subscribes to an opinion, even then antiquated, that only the globose and cylindric species of cacti have stems, and that the compressed joints of such things as the opuntiæ and phyllanthi are not branches but leaves; so that, while the globose and simple sorts are described by him as caulescent, the kinds exhibiting any manner whatever of flattened vegetative organs are classed as acaulescent, though the plants be tall and large in certain cases. But in this error we find one clew, and a sure one, to the identification of his cactaceous genera. Another is given us in connection with the fruits; for he denominates a *bacca* the smooth soft-pulpy small-seeded fruit of some, and as an *achena* that of those which as in *Opuntia* have a firm fleshiness and contain larger and bony seeds.

These few items of Neckerian cactaceous terminology are enough to enable one to determine with certainty the identity of each of his four genera *Cactus, Cirinosum, Carpophillus* and *Phyllanthus.*

Cactus, Neck. Elem. ii, 83. Of this he describes the fruit as being an "olive-shaped many-seeded berry." The only Lin-

næan cacti whose fruits are so small, rounded or elongated and smooth as naturally to be called berries are his *C. mamillaris* and *C. Melocactus.* Necker's *Cactus* is then exactly that of Miller as to its type species. Both authors retain the Linnæan genus name, restricting the genus of that name to the first group of species enumerated by that author; and inasmuch as Miller is the first author of this restricted *Cactus*, the type-species of the genus must evidently be sought of Miller. In a word, Necker's *Cactus* is synonymous with that of Miller.

Cirinosum, Neck. l. c. 84. This is evidently the equivalent of *Cereus*, the spelling of which, in the earliest mention of these plants, I find to have been *Cirius*, meaning the wax taper of church altars. Even the French name given by Necker is *Cierge de Perou*, which in English would be Peruvian Wax Taper, the Latin equivalent being exactly what Linnæus adopted from earlier authors, *Cereus Peruvianus*, which is therefore naturally to be taken as the type of *Cirinosum*.

Carpophyllus, Neck. l. c. 84. This synonym, if it múst needs have been made, should have been written *Carpophyllum;* and still it would have been a mere synonym of *Peireskia*, of which the character of a "globose leafy 3-seeded fruit," assigned by Necker is quite the same given by Father Plumier, who founded the genus. Even the Neckerian name is meant to indicate this curious character of a leafy berry. Some of us who are unwilling that the pre-Linnæan founders of modern botany should be deprived of the credit of their genera, will deem it fortunate that Miller restored *Peireskia;* but for which fact, it seems that *Carpophillus* would now have been forced into the place of the Plumierian name; and that too by some who are willing to assert that in botanical nomenclature "The principle of priority is fundamental."

Phyllarthus, Neck. l. c. 85. The name means leaf-joint, or jointed leaf. The vegetative character attributed to the genus is that of compressed and jointed leaves in the place of stem and branches. It embraces, therefore, both *Opuntia* and *Phyllanthus* of earlier authors. It is not a genus which as to limits will ever in the future meet with approval. It does not differ from Linnæus' fourth group of *Cactus*, and is in fact exactly coexten-

sive with it; Adanson's *Opuntia* being the same group amplified by the admission into it of *Peireskia.*

I account it a happy outcome of the present study, that I am able to say Necker's names for cactaceous genera are all mere synonyms.

North American Species of Amarella.

The Old World *Gentiana lutea* being typical for the genus *Gentiana,* it has long been clear to me that in the New World we have no plants congeric with it, and that the very name *Gentiana* ought to disappear from American indigenous botany; and I have no doubt that will come to pass in the books of some not far distant future. An initiative in this, which I conceive to have been the right direction, was made by Rafinesque before the middle of the nineteenth century; and Mr. Small now, in the beginning of the twentieth century, reasserts such a proposition. But why, in his Flora, he should have adopted the comparatively recent name *Gentianella* instead of the much older AMARELLA, I do not comprehend.

Even from the Linnæan date as initial Gilibert restored the genus and the name AMARELLA some thirteen years anteriorly to the publication of *Gentianella.*

The following are some of our AMARELLA species, over and above those transferred by Rafinesque: A. AURICULATA (Pall. Fl. Ross. ii, t. 92, f. 1), PLEBEIA (Cham. in Bunge, Gent.), HETEROSEPALA (Engelm. Trans. Acad. St. L. ii, 215, t. 8,) WRIGHTII (Gray, Syn. Fl. ii. 118), TENUIS (Griseb. Gent. 250), STRICTIFLORA (Rydb. Fl. Mont. 309), ANISOSEPALA (Greene, Pitt. iii, 309), WISLIZENI (Engelm. l. c.), ARCTOPHILA (Griseb. l. c.), AMARELLOIDES (Michx. Fl. i, 175), OCCIDENTALIS (Gray, Man. 1 ed. 359), PROPINQUA (Rich. App. 734), DISTEGIA (Greene, Pitt. iv, 182), MICROCALYX (Lemmon).

The following may be indicated as new:

A. COPELANDI. *Gentiana Copelandi*, Greene, in Baker distr. of 1903, n. 3849. Erect, sparingly branching, 2 to 8 inches high, floriferous throughout, only sparsely leafy, the internodes 1 to 2 inches long and leaves small, the lowest cuneate-obovate,

obtuse, nerveless ½ to ¾ inch long, the upper oblong-linear and obtuse to linear and acute: flowers large for the genus, ¾ inch long, many on long naked slender pedicels of 1 to 2 inches; calyx cleft far below the middle into 5 unequal lance-linear erect segments, the longest four times the length of the turbinate tube: setaceous crown of the purple corolla conspicuous, the longer setæ nearly equalling the corolla.

On Mount Eddy, Siskiyou Co., California, at 6,000 feet, 6 Sept. 1903, E. B. Copeland. Remarkable for the large and commonly long peduncled flowers.

A. Californica. Erect, strict and simple but for some short axillary flowering branches, 1 to 2 feet high, rather naked-looking, the internodes in large plants 2½ or 3 inches long, terete, though with frequent traces of sharp angles: leaves ovate-lanceolate on the stem, 1½ inches long, sessile by a subcordate base, acutish, conspicuously 1-nerved, the basal ones smaller, spatulate-obovate, obtuse: flowers both few and small for so large a plant; seldom more than ½ inch long; calyx short, deeply cleft into oblong lanceolate acute lobes, the sinuses acute: limb of corolla of acutish segments half as long as the tube; crown of copious setæ.

Sierra Nevada in Plumas and Butte Counties, California, Mrs. Austin.

A. Lemberti. Very slender, only 6 inches high, commonly much branched from the base, all the branches floriferous thoughout: cauline leaves lanceolate, obtuse or only acutish, ¾ inch long, the internodes not much longer, obtusely angled: corolla hardly ½ inch long, calyx short, very deeply cleft into oblong-linear acute lobes, the sinuses acute: segments of the corolla long, acute; crown of delicate setæ not inconspicuous.

Yosemite Valley, California, J. B. Lembert, 1893.

A. Macounii. Nearly simple erect and strict, 1 to 2 feet high, the internodes commonly 2 and 3 inches long: leaves ovate-lanceolate with subcordate base, or the upper lanceolate, all acute, 3-nerved: flowers rather few on short axillary branchlets and pedicels: corolla rather more than ½ inch long: calyx half as long as the corolla, very deeply cleft into oblong-linear acute segments, the sinuses though narrow ending obtusely: segments of

the corolla ovate-oblong, acute, half as long as the tube; fringe of the crown copious, rather short.

Along the Pacific seaboard from Vancouver Island, Macoun, 21 July, 1893, southward into Washington and Oregon.

A. CONFERTA. Stout and rigid, erect and simple, with only very short fascicled flowering branches and pedicels in the axils of the leaves and not exceeding them; internodes an inch long more or less, subterete, with only traces of angularity: leaves rather succulent, oblong, not subcordate, an inch long or less: flowers less than ½ inch; calyx large, nearly or quite equalling the corolla-tube, not very deeply cleft, the segments oblong and lance-oblong, acute, delicately but closely scaberulous on the margin, the sinuses open and obtuse, segments of the corolla oval, obtuse; crown conspicuous.

Chaplin, Assiniboia, 28 Aug. 1895, Mr. Spreadborough, specimens communicated by Mr. Macoun, but the label bearing no number. Species strongly marked in both habit and character.

A. SCOPULORUM. Stoutish, simple or with many branches from the base, mostly 6 to 12 inches high, the stem faintly angular, internodes in larger plants 1 to 3 inches long: middle-stem-leaves oblong, obtuse, 1 to 1½ inches long, 3-nerved, the lowest obovate and spatulate, the uppermost oblong-linear, acute: flowers several in each axil, usually on a short branch, more numerous at summit, commonly about ¾ inch long; longer sepals of the very deeply cleft calyx almost equalling the corolla-tube, all of them linear, acute, the sinuses obtuse: ovate-lanceolate segments of the corolla acute, the appendages deeply and finely fimbriate.

Common species of the Rocky Mountain region from Colorado to Montana; often collected and everywhere distributed in the herbaria.

A. REVOLUTA. Near *A. scopuloram*, but smaller, only 5 or 6 inches high, much more densely leafy and floriferous, the internodes mostly less than an inch long, the ovate-lanceolate revolute leaves nearly as long: corolla little more than ½ inch long: calyx-segments shorter than the corolla-tube, two of them spatulate-linear, two oblong or oblong-linear, the sinuses obtuse:

oblong-ovate teeth of the corolla abruptly acute, nearly equalled by the not very copious fringed appendage.

Southern New Mexico, in the White Mountains, collected and distributed by Mr. Wooton in in 1897, under n. 552.

A. COBRENSIS. Stout, erect, either simple or with copious and very strict axillary flowering branchlets in all but the lowest axils, often 18 inches high; stem distinctly obtusely angled: leaves oval to subcordate-ovate, closely sessile, the largest 1½ inches long, obtuse or acutish, 1-nerved: pale yellowish flowers fully an inch long; short turbinate calyx-tube 10-nerved, the segments lanceolate, acute, finely and closely scabrous-serrulate, the sinuses rather acute, teeth of the corolla nearly ovate, mucronulately acute, fringed appendages long, not copious.

Type specimens collected by myself at Santa Rita del Cobre, southern New Mexico, 11 Oct. 1880. The plant resembles, at first glance, the pale-flowered *A. strictiflora* of middle Colorado, but it is very distinct.

Seven New Apocynums.

An extensive and good collection of specimens of *Apocynum* gathered in the vicinity of Southington, Connecticut, in the seasons of 1902 and 1903, by Mr. Luman Andrews, resident there, and sent to me for determination, affords material compelling the recognition of two New England species hitherto undescribed. To the description of these I add diagnoses of a number of western species of the genus, all but one of which were collected during the years 1902 and 1903 by Mr. Carl F. Baker, whose specimens have already been distributed to many herbaria under the names here used.

A. DIVERGENS. Stem upright, branches widely spreading, the plant 2 or 3 feet high; leaves also spreading ovate and lance-ovate, 2½ to 4 inches long, rounded at base, acute and cuspidately mucronate, above dark-green and glabrous, the veins light-colored, beneath pale and glaucescent as well as villous-arachnoid, along the veins especially: flowers in terminal leafy bracted cymes, sepals lance-ovate; corolla large, campanulate pale flesh-color: follicles 4 inches long, widely divergent, the

pair either horizontally extending or nearly or quite erect, never deflexed.

The type specimens are from the vicinity of Southington, Connecticut, and were collected in July and August, 1903, by Mr. L. Andrews. The species has the habit of *A. androsaemifolium*, the inflorescence, however, not of that but of *A. medium*, while its flowers are larger than those of the former, even. The foliage is remarkably elongated, and the pods are, as in no other known species, horizontal or suberect, the members of each pair diverging at an angle of nearly or quite forty-five degrees.

A plant common in Wisconsin and Minnesota, with erect pods, and less elongated foliage, is provisionally referred to the present species.

A. ANDREWSII. Smaller than the preceding, 1 to 1½ feet high; herbage light-green; leaves elliptic-lanceolate, 3 inches long, ¾ inch broad, subsessile, acutely mucronate, glabrous on both faces, those of the spreading branches smaller: cymes small and few flowered at the ends of all the branches: sepals lance-ovate: corolla small campanulate, flesh-color: follicles not seen.

This also is from about Southington, Conn., by Mr. Andrews, copiously collected in flower in August, 1902, and July, 1903, by the collector taken to be *A. medium*, Greene, from which its long narrow foliage completely distinguishes it. The plant has, by this character, much likeness to the *A. cannabinum* group, though in mode of growth, position of branches, and character of flowers, it is wholly of the *A. androsæmifolium* alliance.

A. CALOPHYLLUM. A foot high, stout, parted from near the base into several densely leafy spreading branches ending in a panicle of 3 or more stout-peduncled densely-flowered compound cymes: leaves firm, the lowest round-ovate or oval, 1 inch long or more and retuse, the others 1½ inches or more and ovate, very obtuse, all saliently mucronate, glabrous, very glaucous and pale beneath, above of the darkest green but the veins and veinlets white; sepals ovate-lanceolate, short; corolla large, deep flesh-color, narrowly campanulate, deeply cleft, the segments ovate-oblong, very obtuse, somewhat spreading: follicles stout, 3 inches long.

An exceedingly beautiful species, of sandy slopes among the mountains of Washoe Co., Nevada, collected by C. F. Baker, 14 Aug. 1902, and distributed by him under n. 1461.

A. TOMENTELLUM. Size of the last, equally stout, branched from the base, with looser ampler inflorescence, the peduncled cymes arising both terminally and from all the upper leaf-axils: leaves all smaller, subcordate-ovate, obtuse, mucronulate, both faces, as well as the whole plant, even to the calyx cinerously tomentulose: sepals ovate, acute, short: corolla flesh-color, middle-sized, with cylindric tube and deep ovate-oblong obtuse segments: follicles not seen.

King's Canon, near Carson City, Nevada, 1 July, 1902, C. F. Baker; distributed under his n. 1209. This and all the foregoing are allies of *A. androsæmifolium*, while all the following are allies of *A. cannabinum*, with the possible exception of *A. oliganthum*.

A. OLIGANTHUM. Two feet high or less, with the pale hue of *A. cannabinum*, but foliage less upright and somewhat spreading, the branching not dichotomous, rather fastigiate, each branch ending in a small few-flowered cyme shorter than its subtending pair of leaves, the cyme terminating the main stem little surpassed by those terminating the subequal branches: herbage glabrous, the oblong cauline leaves 2½ inches long, subcordate, short-petiolate, of a vivid green above, the slender whitish veins conspicuous, underneath pale and glaucous, those of the branches half as large, exceeding the internodes, all mucronate-acute: sepals ovate-trigonous, not half the length of the tube of the small cylindric erect white or pinkish corolla.

Borders of thickets in King's Canon, Ormsby Co., Nevada, C. F. Baker, 20 Aug. 1903. Distributed under n. 1508, and described by Mr. Baker as being a rather low broad bushy plant which would indicate kinship with the *A. androsæmifolium* group.

A. PALUSTRE. Related to *A. cannabinum*, stouter, 3 to 4 feet high, somewhat dichotomous; leaves of main stem 3 or 4 inches long, 2 to 2½ in breadth, oval, obtuse, only the smaller and subelliptic rameal ones cuspidate-mucronate, all vivid green and

white-venulose above, paler and sparsely pubescent beneath, with short curved hairs; cymes many-flowered and dense, especially the terminal one, which is far surpassed by all the others; branches of the cymes, the pedicels, and often the calyx pubescent; sepals lanceolate, acute, of more than half the length of the small corolla, this yellowish white, often tinged with flesh-color.

Frequent in the salt marshes of Suisun Bay, California, the type specimens by Mr. Baker, n. 3247, from near Suisun, 6 June, 1903. The plant enters into the composition of the *A. cannabinum* of my Manual, but it is far enough from being the same as the eastern plant.

A. MYRIANTHUM. About 3 feet high; pale-green, glaucous; simple below, dichotomously branched at summit; the very large and dense terminal panicle of cymes greatly surpassed by the smaller lateral ones; leaves oblong-lanceolate to elliptical, the cauline about 4 inches long, all tapering abruptly to a short petiole, and abruptly though hardly mucronately acute; the venation not conspicuous above, somewhat so beneath; flowers very small, little more than a line long, greenish; sepals lanceolate, equalling or exceeding the tube of the cylindric corolla.

Known only as collected by myself along the Humboldt River at Palisade, Nevada, 24 July, 1893.

Affinities of the Cichoriaceae.

There is before me printed evidence of mental disquiet over the fact that in certain books of recent publication the Cichoriaceæ are not placed "after the Compositæ proper," but before them (Rhodora, vi, 62); and as there is little room for doubt about my being responsible as having suggested not only to the late lamented author of the Flora of Pennsylvania, but also to the writers of two or three more extensive and influential treatises the advisability of receiving this group of plants in the rank of a Natural Family apart from the Compositæ (Pittonia, i, 295, and Bay-Region Manual, 219), it belongs naturally to myself to direct the attention of any mind openly professing to be exercised about these matters, to some part at least, of the much that has been written in times past relating to them.

But first, let me acknowledge that I take a lively interest in the reviewer's speculations as to the origin of the cichoriaceous corolla, which, by the way, is erroneously spoken of as "asymmetrical;" for it was long since established in the terminology of our science that the word symmetrical applies only to the numerical relation between the floral circles, and is predicable of nothing less than the flower as a whole. Neither an asymmetrical or a symmetrical corolla, considered apart, can exist; and the kind of corolla in question is irregular, very irregular; that is all.

Now, while for reasons, some of which were given years ago, others of which I may here adduce, I find it impossible to think of the Eupatoriaceæ and Cichoriaceæ as being of one and the same natural family, or in anywise intimately related, I should never think to look for indications of the evolution of the ligulate corolla of the latter from the tubular one of the former group. I have, indeed, in the careful investigation of fresh flowers of many species of Lobeliaceous plants—between which group and the Cichoriaceæ all systematists of the last hundred and twenty-five years have acknowledged the real affinity—I say I have sought again and again in those lobeliaceous corollas that are split down on one side, in some to the very base, to find the prototype of the cichoriaceous ligule. But it is sometime since I abandoned that line of research as hopeless. The ligule derived from any bilabiate corolla with a split down between the two small lobes, would be expected to present at its apex little if anything more than the three teeth of the lower lip; the remains of the two small upper lobes, if any there should be, ought to be small, very small, and in a manner lateral teeth. But the fact is, that the cichoriaceous corolla exhibits a truncate apex distinctly and equally, often sharply, five-toothed. In my own speculations this one hard irrefragable fact has demolished what was once a favorite hypothesis as to the derivation of the chicory ligule. Those ten sharp equal teeth all terminating in a line, as we may say, must indicate an origin in some perfectly regular pentamerous corolla-type, not even necessarily sympetalous; possibly, or even plausibly, from one in which all

the segments were deep and narrow, as now seen in many a campanulaceous flower.

The theory of the origin of a ligule from a regular pentamerous deeply cleft or parted sympetalous corolla naturally presupposes one of two distinct modes of transformation. It is conceivable that, by the gradual congestion into a dense head of a loose campanulaceous inflorescence, the deeply cleft corolla might loose, one after another or little by little, all of its segments save one; but we should not expect a ligule thus derived to be toothed at all at apex. And what is more, in the curious campanulaceous genus *Jasione*, in which the flowers are crowded into a dense head, involucrate like that of composites, there is still no reduction or alteration of the corolla, this consisting of five narrow-linear equal segments; and the supposition that the ligule of the chicory came about by elimination of segments seems precluded.

The other natural hypothesis, to me seems this: that there was a cohesion of the five segments beginning at the tip and proceeding downwards, until, by a natural tension, a rupture of the incipient apical tube by the uppermost of the five sutures favored a complete union of the segments downwards by the other sutures, until finally the five-toothed—equally five-toothed—ligule become established.

The anthological phases of another campanulaceous genus, *Phyteuma*, illustrate remarkably well the possibilities of the descent of the chicory ligule along such a line, and by such gradual modifications of a regular aud deeply five-parted corolla. In some species of this genus there are the five linear rotate-spreading segments of a kind not unknown in other related genera. In some such it has long been noted by botanists that before the full expansion of the five narrow segments, they cohere lightly at tip, the expansion thus seeming to proceed from the base in such wise that at the tips the segments are finally forced apart by the tension to which they yield at last somewhat suddenly. In others of this genus, the tips are never sundered at all, but form a permanent five-toothed tube which reaches down to the middle of the corolla, or near it, or below it, and below this tubular part, the portion of the segments still

disunited bulge out, as it were to admit air and insects to the generative organs, so that this part of the corolla is inflated and described as fenestrate, or with window-like openings. Of course if this tension of the lower and free portion of the segments may be supposed in some ancestral type—and it easily may—to have caused a rupture of this tube by the upper suture, in such a case, the tension which held separate the fenestrated parts being relieved, the complete union of the segments throughout would easily have followed, and the ligule of the Cichoriaceæ would have come into existence by a process of development exactly the reverse of that of the splitting down from the top of a corolla that was already united and tubular from the base to above the middle.

In Europe where exist not only such suggestive, if not instructive types as *Jasione*, *Phyteuma*, and some others; where from immemorial time, and long before the rise of botany, people detected likeness in aspect and likeness in quality to the extent of using as salads having the same taste, both cichoriaceous and campanulaceous plants; in Europe, I say, it is not strange that really affinity was conceded by the most noted systematists to subsist between these two groups of plants, a good while before the close of the eighteenth century. And it was this fact which, with every noted botanist of the nineteenth century, prevented the placing, in books, of the whole rank and file of the "Compositæ proper" in between the cichoriceæ and their next of kin. But this movement, which is either blindly or else stubbornly retrogressive—surely retrogressive—which interposes nearly or quite a thousand genera, and probably twenty thousand species between groups of plants as closely related, at least, as are the Cruciferеæ and the Capparideæ, or the Ranunculaceæ and the Papaveraceæ—this has been undertaken by men whom our reviewer looks up to as promulgators of a "Modern and very philosophic system of plant arrangement." The author of such a phrase does not, I think, in this instance know well his topic. His "modern and very philosophic German system of plant arrangement" surely is not modern; and that it is philosophic, they who know much about the plant world by long experience

may be permitted to question. Certainly also, the inexperienced, if they will, may make phrases in laudation of inexperience.

What a certain one of the reviewer's "great European systematists" has had to say respecting the Campanulaceæ and Cichoriaceæ as allied, I have read. The reading does not take long; and the writing would seem to have been that of a man who had not himself made any study of the plants themselves from this point of view; even whose reading of what the forefathers, Jussieu, De Candolle, Lindley and Bentham have said, had been but partial, and cursory at that; such a perusal as neither deeply instructed him, nor at all deterred him from assigning the Cichoriaceæ a place which, although I dare say he knew it not, is just that given them two hundred years ago by the authorities of that period, Tournefort, Ray, Haller and others.

We have no great American systematists. But there is hope in our future, so long as we have two or three who, like the late Dr. Porter and the living authors of the most complete and valued manuals of East American botany, dare dissent from what I am wont to think of as German artificialism, in so far as to locate the Cichoriaceæ where nature indicates that they belong.

Some Western Buckthorns.

Rhamnus fasciculata. Shrub with very stout and rigid branches dark-colored, glabrous after the first season, the growing ones pubescent; densely leafy and the foliage of the smallest, deciduous though perhaps tardily so: leaves obovate-oblong, oblong and elliptical, the smaller ¾ inch long, the largest 1¼ inches, obtuse or acutish, firmly and rather sharply serrulate, green above, yellowish beneath, sparsely pubescent on both faces, the hairs spreading and hirtellous, especially along the midvein beneath: flowers not seen: fruit small, 2-seeded.

White Mountains, New Mexico, 25 July, 1897, E. O. Wooton, allied to *R. Smithii*.

Rhamnus ursina. Rigid shrub with many divergent branches and rather loosely leafy, deciduous, the growing branches and the leaves beneath whitish with a minute and dense tomen-

tulose pubescence: leaves oval to ovate-oblong, 1 to 2 inches long, firm, strongly veined, sharply serrulate, mostly acute, the upper face only obscurely puberulent and of a deep green: umbels of immature fruit on peduncles exceeding the half-inch-long petioles.

On Bear Mountain near Silver City, New Mexico, 17 June, 1903, O. B. Metcalfe; also by the same near Mangas Springs, in the same region. The species is not rare in the mountains of the western part of New Mexico and adjacent Arizona.

RHAMNUS CASTOREA. Shrub with rather flexible branches and a subcoriaceous but deciduous foliage, both growing branchlets and lower face of leaves minutely and densely whitish-tomentulose; leaves mostly elliptical, 1 to 2 inches lnog, on stout petioles and traversed by a prominent and very broad midvein beneath, the margins obscurely and often remotely serrate, berries large, usually 3-seeded, the seed nearly orbicular.

Beaver Creek, northern Arizona, Aug. 1883, H. H. Rusby, n. 550 of my set of Dr. Rusby's plants. The specimens have for twenty years been allowed to pass for those of *R. tomentella*, though the character by which it is distinguishable from that exclusively Californian species are obvious.

RHAMNUS CUSPIDATA. Allied to the last two and to *R. tomentella* but smaller, the tomentose pubescence different, coarser, looser and with longer and hirtellous hairs intermixed rather copiously, especially along the veins: leaves ¾ to 2 inches long, oval to elliptical, abruptly and often cuspidately acute, sharply saliently and closely serrulate, those of vigorous shoots with even some coarse serratures below the cuspidate apex: flowers very copious, in dense cymes from all the axils, 5-merous, the triangular calyx-teeth longer than the tube: fruit not seen, said to be well flavored and edible.

Foothills of the mountains in Kern Co., California; the type specimens from near Tehachapi, by the writer, 22 June, 1889.

RHAMNUS OBTUSISSIMA. Deciduous shrub with short rigid densely leafy and finely puberulent branchlets, these dark red-purple the first season, afterwards grayish and glabrate: leaves small, ¾ to 1¼ inches long on very short and slender petioles, of a light green on both faces, thin, glabrous above, puberulent on

the veins beneath, these prominent, of elongated obovate outline cuneately tapering at the base, at apex very obtuse, even often almost truncate, minutely serrulate: umbels nearly sessile, each maturing a single dark-purple fruit large for foliage, 3-seeded.

The type of this new species, allied to *R. rubra*, is by Copeland, from Sisson, Calif. 15 Aug. 1903, distributed by Mr. C. F. Baker under n. 3833. There are traces of the same from Butte Co., by Mrs. Austin.

New Species of Ceanothus.

The study of a new Ceanothus from New Mexico allied to what is commonly known in California as *C. integerrimus* has recalled to my mind what I learned at Kew ten years ago, but have never yet published as to the real identity of the common shrub of California.

In the summer of 1888 Dr. C. Parry brought to me for inspection a *Ceanothus* from the Santa Cruz Mountains unlike any which either he or I had seen before, which he believed to be new, and I could not gainsay it. He therefore soon after published it as *C. Andersonii,* dedicating it to our friend Dr. C. L. Anderson, of Santa Cruz. I adopted the species readily in the Flora Franciscana, without any critical study of it; nor did I doubt its validity until, at Kew Gardens, in 1894, while examining types in this genus, I discovered that the originals of Hooker and Arnots' *C. integerrimus* were precisely what Dr. Parry had published as new under the name *C. Andersonii.*

Consulting the original description by Hooker, we find that that alone, duly regarded, would have saved both Dr. Parry and myself this error; for the leaves are described as "oblong-elliptical," a character which the foliage of the common shrub of the mountains of the interior never exhibits, its leaves everywhere showing something of the ovate in outline; being even very commonly ovate.

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The types of *C. integerrimus* were, of course, taken by Douglas in just that region whence we have the so-called *C. Andersonii.*

And yet, in the original diagnosis, there is some indication that the broad-leaved species had in some shape confronted the authors referred to; for the phrase "foliis 3-costatis" is not true of the specimens to which I refer. That is a mark of the other shrub that has so often been collected and which has usurped the name *C. integerrimus* in the herbaria, and in the books. But the originals of the species so named, as preserved at Kew, and with leaves unvaryingly narrow-oblong, have only a delicate and strictly pinnate venation. The necessary displacement of the name *C. Andersonii* by its reduction to synonymy involves the restoration of Dr. Kellogg's *C. Nevadensis* for the beautiful shrub that so abounds in the foothills of the interior of the State.

C. INTEGERRIMUS, Hook, & Arn. Bot. Beech. 329, not of American authors. *C. Andersonii,* Parry. Proc. Davenp. Acad. v. 172; Greene, Fl. Fr. 81. Leaves thin, narrowly oblong or oblong-elliptic, very obtuse, delicately pinnate-veined, glabrous.

C. NEVADENSIS, Kell. Proc. Calif. Acad. ii. 152. fig. 45. *C. integerrimus,* Greene, l. c., and of American authors generally, not Hook. & Arn. Leaves firm, oval, obtuse or acutish, obtuse at base but not subcordate, 1 to 1½ inches long, veins beneath white and prominent, the lowest lateral pair long and nearly parallel with the midvein, both faces appearing glabrous, a very fine pubescence on the petioles and along the veins beneath.

Chiefly of the Sierra Nevada, Calif., and at middle elevations; good specimens in U. S. Herb from Grant Springs, Mariposa Co., L. F. Ward, 1895, Calaveras Big Trees, Brandegee, 1891, Placer Co., Mrs. Hardy, 1893. From the higher elevations of the Coast Range we have what appears the same in Bakers' n. 3004, and Heller's 5841 and 5886.

C. PUBERULUS. Nearest *C. Nevadensis,* the leaves as large, more oval and obtuse, finely and often even silkily pubescent on both faces, most so on the veins beneath, these far less prominent than in the last.

Peculiar to the mountains of southern California, the oldest

specimens in U. S. Herb., being a sheet from San Bernardino Mountains, by G. R. Vasey, 1880. In 1891 Coville & Funston took good material from Frazier Mountain to the westward of the San Bernardino range, listing it as *C. integerrimus*; but our finest specimens are from Mr. Parish, nn. 3083 and 3385, taken from altitudes of 4000 and 5000 feet in the San Bernardino Mountains in 1894. The pubescence is permanent, being as obvious on mature fruiting specimens as on those young and barely in flower.

C. MYRIANTHUS. Leaves subcoriaceous, oval-oblong, 1½ to 2 inches long, very obtuse at both ends, deep-green and glabrous above, glaucescent beneath, sparsely pubescent on the prominent whitish nerves of which two are prolonged, yet not making the leaf conspicuously triple-veined: flowering branches angular, light-green, not warty or glandular: thyrsiform inflorescence 6 to 8 inches long, rather rigid, paniculately branched and dense with innumerable small white flowers.

Fort Huachuca, Arizona, May, 1890, Dr. Edward Palmer. Related to *C. Palmeri*; remarkable for large rigid leaves and a notably compound inflorescence for this group. It might almost as well be described as a close panicle.

C. MOGOLLONICUS. Allied to *C. Nevadensis*, smaller, more slender, with smaller foliage, the oval obtuse leaves mostly less than an inch long, the largest 1½ inches, deep-green, triple-nerved, paler beneath, nearly or quite glabrous, the margins usually entire, often 3-toothed at the summit, rarely with a few lateral teeth: inflorescences short for this group, simple and few-flowered.

On Mogollon Creek, in the Mogollan Mountains, New Mexico, at 8000 feet, 16 July, 1893, O. B. Metcalfe.

C. PEDUNCULARIS. Leaves firm, oval-oblong, obtuse at base, mucronately acute at apex, triple-nerved, pubescent on both faces, an inch long or more: thyrsus short and simple, only 2 or 3 inches long, on a terete and pubescent leafy-bracted peduncle of 6 or 7 inches; bracts of the peduncle ½ inch long, oblong or elliptic, acute, appressed-pubescent above, silky on the veins beneath; bracts of the umbellules ovate or lanceolate, acuminate, silky-villous.

North side of Mount Hood, Oregon, 1898, H. D. Langille, in U. S. Herb. Allied to *C. Nevadensis*, which is frequent also in Oregon; but this Mount Hood shrub, with its obvious pubescence and peculiar long peduncles, with short inflorences, is quite distinct.

C. MACROTHYRSUS. *C. thyrsiflorus*, Var. macrothyrsus, Torr. Wilkes Exp. 263; *C. integerrimus* of recent writers and collectors, not Hook. & Arn. Growing parts silvery-silky, the mature foliage thin, pubescent on both faces: leaves ovate to oval and oblong-oval, acute or obtusish, commonly subcordate, notably veiny not emphatically triple-veined, the largest 3 inches long, usually entire but those on vigorous shoots lightly serrate, the scattered pubescence marking both faces, but veins beneath villous; thyrsus 6 to 8 inches long, short-peduncled, the peduncle with but few and scarcely reduced leaves.

The original of this excellent species is from the Umpqua Valley, in Oregon, but very good recent specimens have been distributed by Mr. Heller, Mr. H. E. Brown and Dr. Edward Palmer, from the foot-hills of Butte Co., Calif., about Chico.

The Genus Pneumonanthe.

The group of perennial herbs will represented in America by what we call the Closed Gentians and their immediate kindred, and having its Old World counterpart in what Linnæus denominated *Gentiana Pneumonanthe*—perhaps including his *G. Cruciata* and *asclepiada*, perhaps not—was first published as a genus by Valerius Cordus in the year 1561. His name for it originates by simply turning into Greek the name of Lungflower, by which the plant was known to the common people, who held a decoction of its herbage to be efficacious in diseases of the lungs.

Considering that the original and typical Gentian, *G. lutea* has yellow corollas deeply cleft and almost rotate, most like those of a *Swertia* or a *Frasera*—to which genera it is really more related than to any of our blue or purple so-called gentians—it is not remarkable that Cordus' proposition that the blue-flowered gentians having deep-tubular corollas are of

another genus, became at once popular; and most of the herbalists for about a century thereafter both describe and figure it under the name PNEUMONANTHE.

Two authors of that period, however, and both of them far more than herbalists, declined to give their sanction to that name, though both admitted the type to be distinct from *Gentiana*, and the genus a valid one.

In the year 1583, or twenty-two years after the publication of PNEUMONANTHE, Caesalpino, whose book is venerated by all who know the merest outlines of botanical history, as having been the first book of Systematic Botany ever published, devotes a chapter to this gentianaceous type, but holds the opinion that this is the genus *Vincetoxicum* of antiquity, and so, maintains that name.

The other exception to the use of PNEUMONANTHE as a genus name, is that made by Renealmus, in the year 1611. This, too, is a most significant exception; for, if Caesalpino less than thirty years before had inaugurated the era of Systematic Botany by defining all genera, and arranging them in family groups, Renealmus anticipated by three centuries that which seems sure of becoming the twentieth-century idea of the limits of a genus. In Systematic Botany the gifted authors have not been few whose ideas have waited a half-century, or a whole century and even more, before obtaining general recognition and full acceptance. But Renealmus thought and wrought out his views and printed them three centuries ahead of time. And he was the first great specialist in the study of the Gentianceæ; and proposed, in 1611, every segregation from the aggregate *Gentiana* that has yet in these recent times been offered, besides some which, if not yet reinstated, perhaps only wait for a general recognition that may be accorded them in some future, either near or distant. More than one century had passed before such of his gentiana segregates as *Chlora* and *Erythræa* obtained their places in books of botany as good genera; and *Erythræa* was published over and over again at least seven times under seven different names between the years 1753 and 1853; so that only within the last half-century has it come into possession of its rightful name as assigned it by Renealmus almost three hundred years ago.

As to generic nomenclature there was no conservatism with this author. He rejected all the old names, even *Gentiana* itself renaming the type of that genus *Asterias* in allusion to its star-shaped yellow corollas. To *Pneumonanthe* he gave the gave the new name *Cyana*. To the group of species with tetramerous but closed corollas, a group typified by what Linnaeus long afterwards called *G. Cruciata* he gave the name *Tretorrhiza*; and what is perhaps the most showy and beautiful member of this alliance, the type subsequently denominated *G. asclepiadea*, Linn., he placed in generic rank under the name *Dasystephana*.

This last name has now of late come to the front, in Mr. Small's Flora, as the scientific appellation for our group of Closed Gentians. The recognition of this group as a genus is, in so far, a distinct advance upon the long undisturbed taxonomy of the gentians; but the taking up of *Dasystephana* as the name is doubtless ill advised, and this not only as violating that principle of priority which is said to be fundamental, but also because no proper *Dasystephana* occurs within the limits of Mr. Small's Flora. What is known as *G. frigida*, Haenke, of the far West and Northwest is about the only American plant which authors who have insisted on a segregation of the Linnæan *Gentiana* have found congeneric with the *G. asclepiadea* of authors. But, if the types of both *Pneumonanthe* and *Dasystephana* are to be received as congeneric, then the former name is to hold by virtue of its priority over the latter. It was upon this principle that all or nearly all authors of the eighteenth and nineteenth centuries who accepted the Closed Gentians in the rank of a genus, found *Pneumonanthe* the rightful name for them and employed it. Here is a partial list of them: Gilibert (1781), Necker (1790), F. W. Schmidt (1796), S. F. Gray (1821), G. Don (1836), Rafinesque (1836), and by one or more much more recent authors.

Our North American species of PNEUMONANTHE, in so far as known, bear names and synonyms as follows:

P. GLAUCA, Schm. Roem. Archiv. i. I, 10. *Gentiana glauca*, Pall.; P. NEWBERRYI. *Gentiana Newberryi*, A. Gray.; P. SETIGERA. *G. setigera*, A. Gray; P. CALYCOSA, *G. calycosa*, Griseb.; P. PARRYI. *G. Parryi*, Engelm; P. BRACTEOSA. *G. bracteosa*, Greene; P. PLATYPETALA. *G. platypetala*, Griseb; P. MENZIESII. *G. Menziesii*, Griseb; P. SCEPTRUM. *G. sceptrum*, Griseb; P. OREGANA. *G. Oregana*, Engelm; P. AFFINIS. *G. affinis*, Griseb; P. FORWOODII, *G. Forwoodii*, Gray; P. BIGEOVII. *G. Bigelovii*, Gray; P. RUSBYI. *G. Rusbyi*, Greene; P. INTERRUPTA. *G. interrupta*, Greene; P. REMOTA. *G. remota*, Greene; P. PUBERULA. *G. puberula*, Mx. *Dasystephana puberula*, Small; P. SAPONARIA. Schm. *G. Saponaria*, *L.*; *D. Saponaria*, Small.

P. CLAUSA. *Gentiana clausa*, Raf. Med. Fl. i, 210 (1828); *G. Andrewsii*, Griseb. Gent. 287 (1839); *D. Andrewsii*, Small. A comparison of the two descriptions, that by Rafinesque in English, and the eleven years later one in Latin by Grisebach leaves no room for doubt as to the identity of the two. Of the two diagnoses, that by Rafinesque is the fuller, and the name *clausa* is the better of the two, besides having the priority.

P. OCHROLEUCA, Don. *G. ochroleuca*, Froel. This is *Dasystephana villosa* [L.], Small, under the hypothesis that it may be *Gentiana villosa* L. But names should not be founded on suppositions. What *G. villosa* L. was, or is, no one can tell. Nothing answering to the brief account of it exists, in so far as can be ascertained; which is enough to discredit the use of the name.

P. LINEARIS. *G. linearis*, Froēl.

P. FLAVIDA. *G. flavida*, A. Gray (1846); *G. alba*, A. Gray (1848); formerly supposed to be *G. alba*, Muhl., which is a nomen nudum and ought never to have been promulgated.

P. PUBERULA. *G. puberula*, Michx. *D. puberula*, Small; P. DECORA. *G. decora*, Pollard. *D. decora*, Small; P. PARVIFOLIA. *Dasystephana parvifolia*, Small; P. LATIFOLIA. *D. latifolia*, Small. P. PORPHYRIO. *G. Porphyrio*, Gmel; *D. Porphyrio*, Small. P. SPATHACEA. *G. spathacca*, Kunth.

A Rare Swertia

While of late inspecting with some degree of carefulness the North American specimens of *Swertia* in the National Herbarium, my attention was held by a very fair specimen from Montana which presented at first glance a marked unlikeness to all others in one peculiarity of its foliage. The leaves of the bulk of the specimens of whatever species, are remarkably thin when dry, and devoid of any apparent venation beyond what is represented by a single often quite prominent midvein. But this Montana plant presents leaves evidently of a particularly firm texture, their upper face showing five almost equally prominent parallel nerves, so that, in case of my finding it undescribed, I had purposed calling it by a name that would have been in allusion to plantain-like parallel-nerved foliage.

In looking into the earlier, bibliography of the genus, I very naturally encountered the name of *S. fastigiata*, Pursh, published by that author ninety years ago, on a plant from the upper Missouri near the Rocky Mountains, therefore from the identical region whence this specimen had come. And in his diagnosis of his species, brief though it be, mention is made of just the two characters my own first inspection of the specimen in hand had revealed as those warranting the proposal of a species, namely, the conspicuously nerved foliage, and the excessively long sepals, these nearly equalling the corolla; and Pursh says "corollis longitudini calycis," while in all other American Swertias the calyx is notably shorter than the corolla. The corollas of our specimen appear also to have been of a light blue, whereas in the common *Swertia scopulina*, Greene, of the whole Rocky Mountain region the flowers are of a dark blue-purple, very dark. Yet even as to color we have here another mark of Pursh's *S. fastigiata*, the flowers of which are said by him to be "sky-blue."

The specimen made the subject of these comments is by Rydberg and Bessey, their n. 4699 as in U. S. Herb., obtained by them in Jack Creek Cañon, Montana, 15 July, 1897. There is no doubt that in this, at least as seen on sheet n. 390,186, we have the rediscovery of a plant long lost, and very likely somewhat rare, *S. fastigiata*, Pursh.

New Plants from Middle California.

The greater part of the species herein defined form a portion of a most interesting collection made this year in the mountains of Tulare County, California, by Mr. J. D. Culbertson, and the specimens were communicated to me for determination by Mr. Carl F. Baker, who has in hand the distribution of them to herbaria.

The series of diagnoses begins with a small list of new members of the difficult genus LUPINUS.

L. CULBERTSONII. Low perennial, not alpine, neither depressed nor compactly tufted, but subacaulescent, 6 to 10 inches high, with decidedly thinnish foliage and scarcely canescent with a sparse pilose or villous hairiness; petioles long and slender, leaflets 5 to 7, almost elliptic oblong, cuspidately acute, ½ inch long or more; peduncles scapiform, bearing the long raceme just above the foliage, commonly with a solitary leaf toward the base: racemes 2 to 4 inches long, crowded and obscurely verticillate; corolla rich purple, less than ½ inch long, banner little shorter than the other petals, keel narrow, slightly falcate, retrorse-ciliolate.

Forks of the Kaweah River, at 8,000 feet, July, 1904, Mr. J. D. Culbertson. With the habit of the familiar *L. minimus*, but totally different foliage and pubescence. From Summit Lake, at a higher altitude, Mr. Culbertson has the same more pubescent (n. 4552).

L. DASYPHYLLUS. Perennial, the stout simple stems strongly striate, villous, very leafy; leaves large, short-petioled, the lance-linear leaflets (the basal ones cuneate-oblong, very obtuse) 2 inches long, acute, rather loosely villous-hirsute on both faces: racemes sessile, 4 to 6 inches long, the large flowers obviously verticillate, their long linear densely villous bracts not caducous: calyx and pedicels densely long-villous: corolla ½ inch long, purplish, banner smaller than the other petals, keel narrow and little curved, naked, or with a few loose hairs above the middle.

Farwell Gap, at 10,000 feet, 3 Aug. 1904, Mr. Culbertson, n. 4272 of Baker's distribution. Species uncommonly well marked, its near affinities not obvious; the specimens too fragmentary.

L. HYPOLEUCUS. Small tufted alpine perennial, the multicipitous caudex scarcely woody, the long petioles and scarcely longer stems slender, canescently villous, as also the leaves above: leaflets 7 to 9, unequal, somewhat elliptical, the largest ½ inch long, densely white-villous beneath and that face somewhat concave: racemes short, of about 3 whorls of middle-sized deep-purple flowers, the petals subequal, keel not much curved, retrorsely villous-ciliolate from below the middle almost to apex.

Near the summit of White Chief Peak, Mr. Culbertson, 16 July, 1904, being n. 4416 of Baker's distribution somewhat like *L. Danaus* as to size and habit, but with shorter peduncles, shorter racemes, and foliage remarkable for a dense white indument covering the lower face only. The same is in U. S. Herb. from Mt. Goddard, by Hall & Chandler, n. 707, collected in July, 1900.

L. HYPOLASIUS. Low alpine perennial not cespitose, the stoutish stems very leafy and suberect from the branches of the short caudex; petioles slender, leaflets 5 to 7, very unequal all broad and obtuse, cuneate-oblong, ¼ to ½ inch long, appressed-villous above, densely villous-tomentose beneath: racemes short, subsessile, the short peduncles stout; whorls of flowers 3 or 4: corolla purple, ¼ inch long, petals equal, keel falcate, retrose-ciliolate above the middle.

Farwell Gap, Calif., at 10,000 feet, C. A. Purpus, 1897, his n. 5221 as in U. S. Herb. Well distinguished from all other alpine lupines of the district by its stout upright habit, subsessile racemes and broad leaflets.

LOTUS CUPREUS. Low slender flaccid and nearly glabrous perennial, the decumbent stems only 5 to 8 inches long, leafy throughout: lowest leaves of but 3 cuneate-obovate truncate or retuse leaflets, the leaflets of the others 5 to 7 and cuneate-oblong, acutish; stipules of all small, herbaceous, more or less distincly ovate: umbels little exceeding the leaves, the lowest bractless and only 1 or 2-flowered, the others with 3 or 4 flowers subtended by an unifoliolate bract quite like the ordinary leaflet: calyx turbinate, the triangular-subulate teeth shorter than the tube: corolla short, not longer than the breadth of the broad

banner which greatly surpasses the other petals, these all at first dingy-yellow but at length copper-color.

Hackett's Meadows, at 8600 feet, July 18, Baker's n. 4373. The plant by habit is next of kin to *L. formosissimus* (*Hosackia gracilis* Benth.) of the Californian seaboard, but the flowers are extremely different.

SIDALCEA RANUNCULACEA. Stems 1 to 2 feet high, mostly solitary, terminating a slender superficially seated horizontal rootstock, retrorsely hirsute from the decumbent base to near the middle; herbage of a very light green, the long petioles and upper part of stem sparsely hirsute-hairy: leaves orbicular, the lowest 7-cleft and the segments with 2 or 3 obtuse lobes, the cauline more deeply cleft and their segments acutely 3 to 5-lobed, those near the spike 5-parted, the segments lance-linear, entire: spikes very short and dense, and flowers rather large: calyx and pedicels densely villous-hirsute: fruit unknown.

In Hacket's Meadow at 8,600 feet, Culbertson; n. 4318 of C. F. Baker's distribution. The same, but in poor specimens, was collected by Dr. Edward Palmer, in the same region, in 1888 (n. 203) and distributed for *S. spicata*, from which the species differs essentially by its broad oval spikes, large flowers, and a peculiar foliage recalling that of some Ranunculi.

SIDALCEA INTERRUPTA. Size of the last much more slender, apparently also rhizomatous, the stem and petioles loosely pilose with firm spreading hairs; herbage deep-green, but cut of the leaves much as in the last; flowers much smaller, in elongated and often interrupted spikes, or even with solitary flowers scattered up and down below the terminal spicate cluster: pedicels and calyx-tube stellate-pubescent only, but teeth of the latter pilose: fruit much depressed, the nutlets nearly or quite glabrous, obviously though not strongly reticulate.

Habitat of the last, nearly but at a lower altitude, 8,000 feet, and by the same collector, being numbered 4255 by Mr. Baker.

SILENE APERTA. Perennial, slender; erect, 2 feet high or less, with but a single pair of cauline leaves near the middle, these narrowly linear and about 3 inches long, the innermost

basal ones similar to these, but the outer short, oblanceolate, acute; both stem and foliage retrosely puberulent: calyx cleft below the middle, and at least in anthesis expanding to open-campanulate, only the segments herbaceous and even these with scarious margin, the broad and nearly saucer-shaped tubular part scarious, but with several green nerves: corolla greenish, twice the length of the calyx and salverform, the petals as to their expanded portion cuneate-obcordate: fruit not known.

Hackett's Meadows, at 8,600 feet, 16 July, n. 4498 of Baker's distribution. Species with calyx so deeply cleft and so remarkably open as to render doubtful the propriety of its consignment to this genus.

AQUILEGIA PAUCIFLORA. Scarlet-flowered and an ally of *A. truncata*, but subacaulescent, little exceeding a foot in height, only the subligneous and fibrous-coated caudex leafy, the nearly naked and very erect pedunculiform stem bearing from 1 to 5 flowers near the summit: leaves of half the height of the flower-stalk or less, pale and minutely hirtellous beneath, very dark-green and glabrous above, the pedicels and spurs glandular-pubescent: flower 1¼ inches long from tip to tip of spurs and anthers; sepals oval, obtuse, spreading or reflexed, not equalling the spurs; blade of petal distinct but short; filaments puberulent.

Hackett's Meadows, 16 July, in flower only; Baker's n. 4460. The almost stemless habit and peculiar pubescence of the lower leaf face distinguish this subalpine plant well from its large widely branched and many-flowered kindred of the coast.

DELPHINIUM LUPORUM. Root apparently woody-fibrous: solitary stem more than a foot high, slender, sparsely leafy except at base, very light-green, glabrous and shining; lowest leaves 5-parted, the segments round obovate and with 2 or 3 broad rounded and rather deep lobes, those of the stem with more cuneiform divisions and acute lobes, or the divisions simple and entire and of oblong-lanceolate cut in those next below the rather naked peduncled raceme; this very lax, made up of only 5 to 7 large flowers on long and slender ascending pedicels; the pedicels and the long straight slender-conical spur loosely villous-pubescent:

sepals all deep blue-purple, each with a very prominent though narrow apiculation: ovaries canescently villous.

On Coyote Creek, 30 July; Baker's n. 4392. The aspect of the species suggests affinity for *D. decorum* and its kindred; but the root is of another structure entirely.

BISTORTA SCABERULA. Tall and with large foliage but the root unknown: basal leaves upright, a foot long, the oblong blade little longer than the stoutish petiole, mostly obtuse at base, more than an inch wide, thinnish, neither revolute nor crisped, of a vivid green above, the veins there inconspicuous, beneath paler and glaucescent, the midvein broad, neither flattened nor striate, the veins and veinlets, especially the latter, muriculate-scaberulous: stem stoutish, 2 feet high, glabrous, striate, the sheaths 1½ inches long, bearing each a sessile acute leaf about as long: spikes barely in flower and ovoid, scarcely ¾ inch long.

Hackett's Meadows, at 8600 feet, Culbertson, 18 July, 1904, distributed by Mr. Baker under n. 4384. The muriculation of the reticulate veinlets is a peculiar character.

ERIOGONUM JUNCEUM. Suffrutescent, the woody and densely leafy branches only a few inches high, loosely cespitose, white-tomentose as are also the small obovate or obovate-elliptic leaves: slender peduncles 5 to 9 inches high, perfectly glabrous, of a vivid green and reedy-looking, usually but once forked, bearing the involucres ½ to ¾ inch apart, these sessile, narrow-campanulate, glabrous, obtusely toothed: perianths white, the segments with red-brown midvein, all obovate and very obtuse.

Kern River Cañon, 2 Aug. 1904, Culbertson, being n. 4396 of C. F. Baker's distribution. Related to *E. Wrightii*, distinguished by slender glabrous and reedy peduncles, glabrous involucres, and smaller perianths with relatively broad segments. A specimen of what appears the same is in U. S. Herb. from Mt. San Jacinto, 11 Aug. 1897, by H. M. Hall, named *E. Wrightii*.

SWERTIA COVILLEI. Stout-stemmed, rather few-flowered, 6 to 16 inches high; basal leaves in the largest plants 6 inches long, thin and flaccid, not indistinctly 3-nerved, the oblong-lanceolate

acutish blade tapering to a long and broadly winged petiole; flowers on stout pedicels, one in the axil of each bract: sepals lanceolate, acute or acuminate, of scarcely more than half the length of the corolla, this 5-parted, the lobes oval or oblong-obtuse, much exceeding the short stout-subulate filaments, their glands with a laciniate margin, some or all the laciniæ slenderly setaceous-pointed; color of corolla blue-purple but not dark; seeds broadly winged.

Crabtree Meadows, at 11,000 feet, 18 Aug., 1904, Culbertson; these specimens in fruit. The flowering specimens used in making the diagnosis are Coville & Funston's n. 1629 of the Death Valley Expedition.

CASTILLEIA TRISECTA. Stems tufted on a tap-root, erect, simple, a foot high, loosely leafy, the whole herbage sparsely pubescent and somewhat clammy, light-green: leaves about 1½ inches long, of a broadly linear or quadrate undivided portion terminated by 3 narrowly linear unequal segments, the middle one largest: spike lax, its trifid bracts scarlet: calyx deeply cleft on the upper side, the 4 short subequal lobes scarlet: corolla with only the long straight ascending galea exserted.

Hacketts Meadows, at 8,600 feet, 18 July; Baker's n. 4431. Allied to Nuttall's *C. augustifolia*, but with different foliage, and flowers rather more like those of *C. linariifolia.*

CASTILLEIA CULBERTSONII. Slender subalpine perennial, the stems not tufted, each from its own very slender horizontal rootstock, erect, 4 to 6 inches high, both stem and small narrowly lanceolate acuminate entire leaves minutely and sparingly hirtellous: spike short but flowers rather large; bracts trifid, the lowest green and leaf-like, the others red-purple; calyx villous, unequally cleft, the teeth shorter than the tube: galea of the corolla prominent, but shorter than the tube.

Crabtree Meadow, at 11,000 feet, near Mt. Whitney, 17 Aug., Culbertson. In a stouter and more pubescent state the plant occurs in U. S. Herb. as collected by Hall & Chandler at 10,000 feet in the mountains of Fresno Co., July, 1900, the label bearing the name *C. Lemmoni,* which species differs widely from this in habit, its stems being tufted upon the subligneous crown of a tap-root.

PENTSTEMON CEPHALOPHORUS. Subspecific to *P. procerus*; low and stout, herbaceous save as to the horizontally superficially seated subligneous rootstock, the stongly decumbent flowering stems 4 to 8 inches high, glabrous below, as are also the obovate or spatulate subcoriaceous basal leaves, but upper part of stem and the inflorescence, even to the corollas, sparsely and slenderly glandular-hairy : cauline leaves in 3 pairs, all of oblong outline, rather larger than the basal ones, all entire, the middle pair usually with a few flowers in the axils, the summit of the stem crowned with a dense globose and capitate cluster: sepals thin lance-linear: corollas less than ½ inch long, straight and narrowly tubular, with a small limb of short subequal rounded segments; color purplish.

Summit Lakes, at 11,000 feet, Culbertson, 19 Aug., 1994. Bakers' n. 4551.

APOCYNUM CARDIOPHYLLUM. Small and rather slender, only 8 or 10 inches high, very erect, branching from near the base, stem and lower face of leaves very glaucous, the whole plant glabrous; leaves short-petioled and all deflexed, mostly about 1 inch long, at base subcordate or occasionally only truncate, at apex very obtuse, mucronate, dark-green and pale-veiny above; flowers rather many, terminal and from the axils of the upper leaves, of large size but in small clusters: sepals short, ovate, acuminate, of about one-fourth the length of the large, deeply flesh-colored corollas, these broad-cylindric, about ⅓ inch long, their at length spreading lobes very short and obtuse; fruit not seen.

Hackett's Meadows, at 9,000 feet, Culbertson, 18 July, 1904. Baker's n. 4472. Very near that more northerly dwarf with decumbent stems, broader leaves, and more deeply cleft corolla, now called *A. pumilum*.

CRYPTANTHE INCANA. Annual, freely branched from near the base, the branches ascending, a foot long or less; whole plant cinerous-hispidulous and with a different minute strigose hairiness underneath the more copious hispid indument: flowering branches loosely spicate, bractless except at base: calyx small, the sepals short, narrow throughout, not with attenuate or pro-

longed apex: nutlets apparently 4, or sometimes 2 only, a half-line long, elongated-ovate above a truncate base, rather abruptly and obtusely pointed, the ventral groove forked at base and closed throughout, the whole surface greyish mottled with dark-brown, smooth and polished.

On Nine-Mile Creek, at 5,800 feet, Culbertson, 30 Aug., 1904; Baker's n. 4537.

GALIUM CULBERTSONII. Rigid herbaceous perennial, with nearly simple stems about a foot high from horizontal subligneous rootstocks at least partly subterranean angles: of the stem, as well as margin and midvein of the leaves, minutely villous-hispid, a more minute and partly appressed pubescence between the angles of the stem: leaves in fours, of firm texture, less than ½inch long, oval, but ending in a very prominent cusp: flowers few, minute, greenish: fruits (immature) apparently baccate, on deflexed pedicels of ¼ to ½ inch long, to the unaided eye appearing glabrous, but under a lens seen to be sparsely and minutely hispidulous-hairy.

South fork the Kaweah River, 20 June, 1904, J. D. Culbertson. The near affinities of this *Galium* are not obvious to me.

CHRYSOTHAMNUS VULCANICUS. Shrub allied to *C. Parryi* of Colorado, more slender, the leaves very narrowly linear and very acute, indistinctly 3-nerved throughout, glabrous, or when young obscurely glandular and viscid; heads forming a narrow thyrsiform panicle, the head little more than ½ inch high, narrow, mostly 5-flowered, its bracts about 10, thin, lanceolate-subulate, slender-pointed, the outermost more herbaceous, and woolly on the margin at the base: corollas rather deeply cleft, the teeth always erect: pappus copious, achenes silky-villous.

On Volcano Creek, above Volcano Falls, at 8,000 feet 9 Aug. *C. Parryi* has much broader foliage, a more leafy thyrsus, and broader involucres with flowers twice as numerous.

CHRYSOTHAMNUS ASPER. Resembling the last, though stouter, the woolliness of the stems more loose and white; leaves as narrow but firmer, rather strongly glandular-scabrous under a lens, this indument extending to the outer bracts of the involucres: heads subsessile, forming a more strictly thyrsoid in-

florescence, most 10 or 12-flowered; bracts oblong-linear, slender-pointed, none with woolly margin: corollas and achenes as in the last.

This is n. 1690 of the Death Valley Expedition from the Sierra Nevada in Inyo Co., listed in the report as *Bigelovia Bolandri*, which type can not, I think, have been known by him who made this reference; and, in the U. S. Herb. the sheet was long since placed in the cover of *C. Parryi*, which it is like in habit, though different in character.

Macronema Bolandri. *Linosyris Bolandri*, Gray, Proc. Am. Acad. vii, 354. *Chrysothamnus Bolandri*, Greene, Eryth. iii, 114. My remarks in Erythea, as to the seeming desirability of removing this type to *Macronema*, seem now more than ever forcible; for, in looking over the numerous sheets of *Macronema discoidea* now in the U. S. Herb., I detect something like a half-dozen specimens of the Bolandrian shrub, some of them from the original station, that have by others been taken for, and labelled as *M. discoidea.* It is even hardly more than a subspecies of this genus; for it differs from that one with which people so easily confuse it, by no clearer characters than those of a rather narrower and more pointed leaf, and slightly narrower heads more numerous and apt to be crowded together. And there are two or three other forms under the aggregate *M. discoidea* that might almost as well be distinguished as this one.

Certain West American Cruciferae.

The Californian cruciferæ in general, and perhaps more especially that extensive list of species that have been variously referred to *Arabis*, *Streptanthus*, *Caulanthus*, *Stanfordia*, and *Thelypodium* have occupied a good share of my most careful and critical attention during the last quarter-century.

Fifteen years ago, having in preparation the Flora Franciscana, I could see no alternative between dividing the *Streptanthus* series into two or three genera, or restoring to it *Caulanthus* and *Stanfordia*; and I decided in favor of the latter course. It was not satisfactory; and it has for some years seemed to me

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that something like the restoring *Caulanthus* as a genus and the merging in it of the perennial Streptanthi of the Rocky Mountains and the Great Basin had been a better course. But the most needful thing to be done, as I now view the case, is the complete segregation from *Streptanthus* of many, if not all the Californian plants that have been so referred; for in their floral characters they are extremely different from the typical species belonging to the flora of distant Texas and Arkansas. Whether, however, these annuals and perennials of California were better placed as constituting one new genus or two three, is a matter concerning which there might easily be diversity of opinion, and upon which my own might change under more light.

Most of the Californian species were first really described by myself; this being said not only of the many kinds that were discovered and first published by me, but also of most of those named and imperfectly or even falsely described by earlier authors. For that particular group which Nuttall indicated as sub-generic under the name Euclisia, and which I here propose in the rank of a genus of the same name, the characters of the species reside chiefly in the calyx; the corolla in all being extremely different from that of true *Streptanthus*, as has been indicated by many authors; but the corolla of EUCLISIA is in no particular different from that of all *Caulanthus*, *Stanfordia*, and a great proportion of the species at present referred to *Thelypodium*.

On the calyx alone, then, unless the flatness of the pods, and the absence of broad more or less rounded bracts replacing leaves upon the stem, EUCLISIA must seem to rest; and those marks of the calyx I have presented fully, in the diagnosis of species in the Flora Franciscana, and in the Bay Region Manual. It is, on the whole, a bilabiate calyx, in at least, the typical species, three of the sepals being connivent together at tip behind the corolla on the upper side; the individual sepals sharply carinate, also never green, but white or else deeply, usually even darkly colored. I append a partial list of species.

E. GLANDULOSA. *S. glandulosus*, Hook. Ic. c. 40 (1836), as to original specimens, but figures false. *S. peramœnus*, Greene,

Bull. Torr. Club, xiii. 142 (1886), also Fl. Fr. 261, and Man. 17. I did not believe that the plant with the remarkably irregular calyx described by me could be that which had been intended by Hooker's figure until I had seen the originals of *S. glandulosus* at Kew. Such falsification of the characters of a species is not publication; and this beautiful plant was truly first described, and therefore first published, as *S. peramœnus,* which name ought to be continued in use, and Hooker's suppressed as being worse than a nomen nudum.

E. MILDREDÆ. *Streptanthus Mildredæ,* Greene, Fl. Fr. 260.

E. BIOLETTII. *S. Biolettii,* Greene, Pitt. ii 225.

E. PULCHELLA. *S. pulchellus,* Greene, l. c.

E. NIGRA. *S. niger,* Greene, Bull. Torr. Club. xiii 141.

E. ASPERA. *S. asper,* Greene, Pitt. iii 225.

E. ALBIDA. *S. albidus,* Greene, Pitt. i. 62.

E. SECUNDA. *S. secundus,* Greene, Fl. Fr. 261.

E. HISPIDA. *S. hispidus,* A. Gray. Am. Acad. vi. 184.

E. VERSICOLOR. *S. versicolor,* Greene, Eryth. iii. 99. In publishing this species now nearly ten years since, I expressed dissatisfaction with it and its allies as members of *Streptanthus.* The corolla in this one is extremely bilabiate.

E. VIOLACEA. Doubtless annual and larger, perhaps two feet high or more, but only the upper leaves and flowering branches known, these perfectly glabrous, glaucescent; leaves lance-linear and sagittate-clasping, remotely dentate: racemes several, slender, the flowers slenderly pedicellate: calyx bilabiate, the 3 upper sepals connivent together at tip, obtusely keeled, of a rich violet or red-purple ; corolla as strongly bilabiate, the large upper petals with white-margined and rather wide limb, the corolla otherwise like the calyx as to color: stamens in 3 very unequal pairs; upper pair of filaments completely united and anthers greatly reduced : pods 3 inches long or more, straight, ascending, very narrow.

Solitary upper and widely branched part of a plant otherwise unknown, collected somewhere in middle California by Dr. Edw. Palmer, in 1876; specimen in U. S. Herb. sheet 4297. Three specimens in U. S. Herb. from San Luis Obispo, by M.

E. Jones, in 1882 are probably the same; smaller plants, glabrous throughout, the upper filaments not quite so completely joined.

E. ELATIOR. Stout annual, erect, branched above, commonly 2 feet high: lowest leaves 2 to 4 inches long, laciniately lobed or pinnatifid, the lobes not gland-tipped, both faces of leaf as well as base of stem hispid, not even the narrow auriculate-clasping cauline ones glabrous, but these merely dentate: racemes lax: bilabiate calyx and corolla red-purple: upper pair of filaments united to above the middle, their anthers much reduced: pod 3 inches long, ascending, straight or slightly curved upwards.

The type, with large laciniate and prickly foliage is from the Santa Lucia Mountains, California, occupying sheet 4, 295 in U. S. Herb., G. R. Vasey having obtained it in 1880. Certain specimens distributed from Santa Lucia Mountains, as *S. glandulosus*, by R. A. Plaskett, seem to belong here, though their foliage is not as ample and is more slightly and regularly rather than laciniately lobed.

E. BAKERI. Habit of *E. glandulosa*, and about as large, stouter, more sparsely hispidulous and the hairs much shorter; leaves and their teeth equally gland-tipped: calyx shorter, its sepals less acute and less connivent, colored very dark and dull purple: petals narrow, also dark purple save as to the white and strongly crisped narrow margin: upper pair of stamens exserted quite beyond the petals, united to near the summit by the filaments, their anthers of less than one-third the size of the other four, these last on very short filaments and borne scarcely beyond the summit of the calyx.

Near Bethany, on the plains of the upper San Joaquin, 27 April, 1903, C. F. Baker; distributed by him under n. 2785, and under my manuscript name *S. Bakeri.* Pods not known. Calyx of the size and blackish coloring of that of *E. Biolettii*, but the sepals wanting the sharply keeled character they have in that species.

E. AMPLEXICAULIS. *Caulanthus amplexicaulis*, Wats. Proc. Am. Acad, xvii 364. With the inflorescence and flowers of *Euclisia*, at least as to the texture, coloring and peculiar irregu-

larity of the calyx, I readily refer this plant here, notwithstanding that its foliage and bracts no less than its narrow pods would relegate it to the next genus, were not the calycine characters to be regarded the most essential in deciding the genus.

For a considerable group of species, among which those that I regard as most typical of a genus are mainly Californian and biennial, I propose the generic name PLEIOCARDIA, in allusion to what gives them an aspect decidedly their own when compared with members of *Euclisia*, namely, the presence of large more or less rounded sessile and cordate bracts—disciform organs—taking the place of ordinary leaves upon the flowering branches, often numerously subtending the racemes. By this striking vegetative character these plants may seem related to *Euclisia*, in some such degree as the Old World *Lepidium perfoliatum* and its kindred, with their pinnatisect true leaves, and round disciform phyllodes subtending the racemes, are related to more genuine *Lepidium*. But these with the "perfoliate" discs in place of upper cauline leaves were segregated from *Lepidium* under the name *Candis* by Adanson, and have been maintained in that rank by later authors under one or more later names. I should not hesitate to accept them as a genus.

But this vegetative character is not essential to PLEIOCARDIA. While it suggested the generic name I admit to the genus a few species that have not that mark; and even the original species of *Streptanthus* have broad and cordate-clasping upper leaves, though the transition to them is not abrupt as it is in the Californian plants of the proposed new genus.

The essential characters of PLEIOCARDIA are those of flower and fruit. Its calyx is (1) regular, not bilabiate as in *Euclisia*, (2) closely fitting up to the corolla and stamens, not distended and as it were inflated between base and summit; (3) tips of sepals dilated, recurved and scarious-edged as in neither *Streptanthus* nor *Euclisia*; (4) petals not radiating cruciformly as in *Streptanthus* but diverging in opposite pairs as in *Euclisia*; (5) stamens in 3 unequal pairs, all distinct as in *Streptanthus* (in

which though distinct they are equal); (6) receptacle mostly enlarged under the fruit as in *Thelypodium*, but in neither *Euclisia* nor *Streptanthus*; (7) pods in certain species narrow and torulose as in *Thelypodium*, and with small but plump seeds wingless and even marginless.

PLEIOCARDIA, then, has a calyx peculiarly its own, a corolla nearest that of *Euclisia*, though in several species with petals showing a well developed limb, thus inclining to *Streptanthus*, stamens half way between those of the two genera, and often with the pods and seeds of *Thelypodium*, though nearer in floral character making any approach to the type of that genus.

In arranging the sequence of species my custom is to place those first which seem to me to have the clearest claim to represent a genus; and therefore these stand as its type.

P. TORTUOSA. *S. tortuosus*, Kell. Greene, Fl. Fr. 258.

P. FOLIOSA. *S. foliosus*, Greene, Pitt. iii. 226.

P. ORBICULATA. *S. orbiculatus*, Greene, Fl. Fr. 258.

P. SUFFRUTESCENS. *S. suffrutescens*, Greene, Erythea, i. 147. Doubtless flowering at first as a biennial, after that enduring for several years and becoming suffrutescent.

Those next following are, I think, all mere annuals, most of them in at least one particular as well fitted as the preceding group to stand as typical of a genus. I even apprehend their being placed, by and by, in the rank of a separate genus on account of their having the pods and seeds of *Thelypodium*.

P. BREWERI. S. Breweri, Gray, Greene, Fl. Fr. 259.

P. HESPERIDIS. *S. hesperidis*, Jeps. Erythea, i. 14.

P. GRACILIS. *S. gracilis*, Eastw. Proc. Cal. Acad. 2 Ser. ii. 285. I have not seen this plant, but Miss Eastwood's diagnosis leaves no room for doubt as to its being a genuine *Pleiocardia*.

P. FENESTRATA. Low slender glabrous glaucous annual, branched from the base, 6 inches high; proper foliage wanting in the very mature specimens, a few small ovate cordate-clasping entire bracts on the branches: calyx very small, deep-purple: corolla large for the plant, the petals with well developed broadly obovate limb and slender claw, the whole of a faint rose-color beautifully fenestrate with delicate dark-red veins:

pods slender, straight, acute, 1 to ½ inches long, spreading or deflexed, not strongly compressed, lightly torulose: seeds oval, thickish, marginless.

Tehipite Valley, Fresno Co , Calif. Hall & Chandler, July, 1900, distributed under n. 492 ; type in U. S. Herb.

P. MAGNA. Stout glabrous glaucous annual branched from near the base, 2 feet high: lowest leaves spatulate-obovate, 3 inches long, 1½ broad, coarsely dentate, the broad triangular teeth not callous-tipped, those subtending the branches shorter, cordate-ovate, obtuse, entire or nearly so: flowers not seen: fruiting raceme long, lax, the pedicels 1 to 1½ inches long, stoutish, ascending: pods very long and slender, 3 to 4½ inches long, subterete, scarcely torulose, straight and ascending or subfalcate-recurved, tipped with a prominent style: seeds small, oblong-linear, marginless.

This plant, truly remarkable for its size among members of this group, was sent me many years since, by W. G. Wright, of San Bernardino, for my opinion as to its being *Streptanthus Breweri*, to which, in habit and foliage it bears no slight resemblance; and I am confident its place is near it. It was found by Mr. Wright at an elevation of 4900 feet in the San Bernardino Mountains, in 1889.

Ecologically connecting with the last, as well as more or less truly allied to it by the long narrow pods and nearly or quite wingless seeds, are several streptanthoid plants of southern California which for several reasons I decline to refer to *Pleiocardia.* They are still further removed from *Euclisia.* They are perennials also, and have their congeneric affinity, I am persuaded, with such plants as Nuttall's *Streptanthus cordatus* and my own segregates of that. Here also I would place that plant of northern California that is called *S. barbatus.* It falls into none of the genera proposed in this paper; and the whole group of these perennials, every member of which is, I think, foreign to *Streptanthus*, needs to be studied carefully in connection with all those embraced within Mr. Watson's confused and illogical *Cau-*

lanthus. The species have a wide range from away among the Rocky Mountains, throughout the Great Basin, several reaching California, and many are as yet undescribed. They demand an investigation that I can not now give.

There are a few more Californian annuals belonging partly to middle elevations in the Sierra Nevada and partly to corresponding elevations in the inner Coast Range which, in so far as known have permitted to figure as members of the impossible *Streptanthus* of Gray and of Watson. Nor can I consistently refer any one of these to either of those new genera already outlined. One of them is *Streptanthus diversifolius*, Wats. After the manner of typical *Pleiocardia* it bears a few heart-shaped though commonly long-pointed bracts near the inflorescence, though in habit and aspect it is again most unlike these, being tall and paniculate-branched, and exhibiting a most peculiar foliage. The lowest leaves are perfectly entire and linear-filiform. In the middle of the stem are borne a few that are pinnatisect, made up of a filiform rachis along which are scattered a few filiform segments. So far, as also as by the perfect smoothness of and the bluish bloom covering all parts of the plant, it promptly recalls my genus *Sibara* of the Lower Californian coasts and islands. But the flowers have all the general characteristics of the allies of *Streptanthus* when compared, with those of the *Arabis* alliance. The calyx, as to its form, is that of *Pleiocardia*, but the texture of it is that of *Euclisia*; also the upper pair of stamens are united. The pods are very long, slender, straight and deflexed, and the seeds are wing-margined, the valves being flattened. As representing a genus, I name this fine type

MITOPHYLLUM DIVERSIFOLIUM. *S. diversifolus*, Wats., doubtless including *S. linearis*, Greene ; for among the best specimens of the latter, I now perceive one bearing in the midst of its array of long filiform leaves a single pinnatisect one. The segments are so remote and narrow as to easily blind one to the

pinnate character of a solitary leaf, at least in the pressed specimens.

Corresponding to the last in habitat, but having a more northerly range in the Sierra, and still passing for a *Streptanthus*, though of floral character most anomalous in the cruciferæ, is what I wish to designate as

MICROSEMIA POLYGALOIDES. *S. polygaloides*, Gray. The remarkable peculiarity of one large colored banner-like sepal standing nearly upright in expansion, and in bud folded down over all the others and enclosing them, was first described by the writer, Pittonia, ii. 46, and again in the Flora Franciscana, p. 262. Among fifty accomplished taxonomists, perhaps not one, with a mere spike of such flowers before him, and without other evidence, would guess this plant to be a crucifer, or believe it to be such until he had dissected it. It belongs, indeed, in the same tribe of crucifers as *Streptanthus*, but is as remote from that genus as is possible within such tribal limits.

Not as much can be said of the following type, which is apparently as peculiar to the Coast Range as *Microsemia* and *Mitophyllum* are to the Sierra Nevada. The type species is my *Streptanthus barbiger*; and there are two congeneric species known to me that are hitherto undescribed.

These plants have a glabrous glaucescent herbage, and all except the very lowest and somewhat lanceolate and toothed leaves are narrow and entire. The habit, and the spicate flowers are points of contact with *Microsemia*; but the calyx is perfectly that of *Pleiocardia*, being quite as herbaceous and close-fitting, with tips of sepals even more prolonged, recurved and white-margined, but there is no more hint or trace of the rounded bracts subtending the inflorescence here than there is in *Microsemia*, in which latter I am persuaded the plants have, as I think, their nearest ally despite the fact that none of the species show any sign of that strange metamorphosis of sepals characteristic of that type.

Alluding, in the generic name, to habitat of this little group, I name the type species

MESOREANTHUS BARBIGER. *S. barbiger*, Greene, resting it

upon the original plant with hirsute sepals, and excluding what I had guessed to be a glabrous form of it.

M. FALLAX. Slender glabrous glaucous annual freely branched above the base, 1 to 2 feet high: leaves unknown; flowers subsessile and fruiting spikes long and lax: flowers small, the spreading or recurved tips of the sepals very long, equalling or even exceeding the small dark-red white-edged petals: only the upper pair of stamens equalling the sepals, their filaments united to summit, their anthers very small: pods very narrow, compressed but slightly torulose, 1½ inches long, curved downwards on very short spreading pedicels: seeds oval, little compressed, marginless.

Hills above Napa Valley near St. Helena, collected by the writer in July, 1891, and then believed to be a form of the preceding; but the few flowers remaining on one specimen which was at the time given to the U. S. Herb. show clear specific characters, as I now perceive. The other specimens taken were copiously fruiting, but otherwise naked.

M. VIMINEUS. Size and habit of the last, equally glabrous and glaucous: lower leaves narrowly oblanceolate; upper lance-linear, those of the branches narrowly linear, all entire: flowers more showy in long loose spikes: calyx with comparatively short and white-petaloid tips greatly exceeded by the rather ample white petals; pods unknown.

Near Lakeport, Cal., 3 May, 1903, C. F. Baker, the specimens distributed by him under n. 3059 as *Streptanthus vimineus* Greene, n. sp. Here described from two sheets of specimens in my own herbarium.

Laothoe.

Part III of Rafinesque's Flora Telluriana must be among the more scarce of that author's publications; and it is one which I do not recall having seen until recently. Consulting that part of the brochure in which he discusses certain gentians, I read on beyond those pages, and came at length to a paragraph in

which he proposes as a new generic type De Candolle's *Scilla pomeridiana*, which I knew to be a familiar Californian plant, commonly called *Chlorogalum pomeridianum.* This last generic name I recalled as certainly not published until a later date han this LAOTHOE of Rafinesque; and a subsequent comparison of the dates results in a showing of seven years of priority for LAOTHOE; and I find that Mr. Jackson both gave this name a place in the Index Kewensis as a synonym, and also remarked its right of priority over the name assigned by Kunth in 1843.

At Rafinesque's date of 1836, only one species was known; but now there are a half-dozen, all having been published under the name of *Chlorogalum*, which can have no other status by right than that of a synonym of LAOTHOE, the recognized species of which are

L. AUGUSTIFOLIA. (Kell. Calif. Acad. ii. 104).
L. DIVARICATA. (Kunth. Enum. iv. 682).
L. LEICHTLINII. (Baker, Gard. Chron. for 1874, p. 689).
L. PARVIFLORA. (Wats. Proc. Am. Acad. xiv. 243).
L. POMERIDIANA. (Ker.) Raf. Fl. Tell. iii. 53.
L. PURPUREA. (Brandg. Zoe, iv. 159).

On Certain Gentianaceae.

Regarding my interpretation of the habitat of Pursh's *Swertia fastigiata*, given on page 72 preceding, I have been persuaded by Mr. C. V. Piper that Pursh must be understood as meaning not on this side, but the other side of the Rocky Mountains; and I have little reason to controvert such an opinion in the presence of one who, like Mr. Piper, has lived and travelled along the route of the Lewis and Clarke expedition, and has particularly studied that route. Admitting, then, the correctness of Mr. Piper as to where the gentianaceous herb in question must have been gathered, it may have to be conceded that Pursh's *Swertia* probably is what high authorities have maintained that it is, namely, *Frasera thyrsiflora*, Hook. Against this view it may be objected that, inasmuch as Pursh

knew the genus *Frasera* and admitted it as good, he could not reasonably have referred to *Swertia* so close an ally of typical *Frasera* as *F. thyrsiflora,* plainly is. Again: since the *Swertia* of Linnæus which Pursh cites as identical with his own, has pentamerous flowers, Pursh must needs have placed his *S. fastigiata* in *Frasera* on account of its tetramery, if be the same thing as *F. thyrsiflora.*

Nevertheless, allowance must be made for superficiality and carelessness everywhere; and if Pursh erred as to the plant's having come from the Missouri Flats, he may have failed to examine it closely enough to discover that its flowers were tetramerous and that it was a *Frasera.* Very likely what he saw was at best a mere scrap or two.

But while I should not be surprised were the Montana plant spoken of by me heretofore to be proven, some day, to be Pursh's plant, I will now at least give the type before me a diagnosis, and therewith a provisional name as possibly new.

SWERTIA PARALLELA. Stem simple, stout for the genus, 12 or 14 inches high, with two pairs of cauline leaves, those from the root or rootstock of half the length of the stem, elliptic oblong as to the blade, this tapering to a long petiolar base, all traversed from base of broad petiole to near the end of the blade by about 5 conspicuous whitish parallel veins: inflorescence somewhat congested, its more terminal portion almost thyrsoid: subulate-lanceolate sepals nearly equalling the lurid-purplish not dark-colored corolla: filaments much flattened and oblong-liguliform, obtuse at apex behind the anthers: fruit not known.

Jack Creek Canon, Montana, 15 July, 1896, Rydberg & Bessey, n. 4699 of their distribution as represented in U. S. Herb. (sheet 390186,. Plant more than other swertias resembling a *Frasera,* especially by its notably parallel-veined foliage

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Botanizing among the hills of Monroe County, Wisconsin, in early October last, the sight of no autumnal flower of the region was more welcome to me than that of what in boyhood we

were taught to call *Gentiana quinqueflora.* I had not seen it, except in the herbaria, for several decades of years; and my first glance at the plant awakened something like a regret for having, not many weeks before, been betrayed by false descriptions of it in the books, into placing it as a congeneric with those *Amarella* species of the farther West, the memory of whose floral characteristics was and is still vivid.

Those western plants, genuine *Amarella* species, have a corolla-limb that is rotate when expanded, or nearly rotate, so that the corolla is salverform, or nearly that, and, at all events, the limb expands. The same is said to be true of the *G. quinqueflora*, but it is not so. Its corolla is not even truly funnelform, for its limb is never expanded at all, in the proper use of that term. The whole corolla is tightly closed during almost the whole period of its existence; and the only writer who describes it as if he had seen it with the eye of a botanist, calls it clavate. That is much nearer the truth than any one else has come; a not indistinct angularity of both tube and closed limb being the only obstacle to its being described as clavate.

At the time when these plants are at their best, showing their corollas at full development and at the height of their intensity of purple coloring,—the time when you would take them for the making of the most perfect herbarium specimens—they are not in flower, but long past that period, the corollas already being filled with full grown capsules. At actual flowering the corollas are much smaller, the tips of their segments are separated just far enough to let air and small insects pass within; they do not spread even so far as to become erect; and then, immediately after fertilization of the ovary, the corolla closes, never again to open, but, immediately proceeds to increase to about twice the size it had at actual anthesis.

These things are said confidently and for a certainty, only of the western plant, at page 53 preceding denominated *Amarella occidentalis*; but they probably hold good, in at least some general way, for the other members of what, if I mistake not, is both a good genus, and one embracing several species.

In part III of the Flora Telluriana, page 21, Rafinesque succinctly characterizes this type as a genus, and names it ALOITIS; and while feeling compelled to agree with him, even as to the species which he segregates, I must add the characters of several more.

ALOITIS OCCIDENTALIS. *Amarella occidentalis* (Gray), Greene, Leafl. i. 53. Calyx-segments usually lanceolate or oblong-lanceolate, foliaceous, half the length of the corolla, merely acute, by their breadth often nearly or quite closing the sinuses.

Prairie regions of Iowa, Wisconsin, Minnesota and westward.

A. MESOCHORA. Larger plant than the last, with larger foliage and larger flowers but of less branching habit, large plants often simple save as to the axillary peduncuiliform branches: calyx with extremely narrow tube, the unequal segments partly linear, partly lanceolate, all setaceously acuminate, the longest of notably less than half the length of the corolla, the sinuses not closed, acute: corolla-lobes with unusually long and slender acumination.

Northern Indiana, also adjacent Michigan and westward to Illinois and Iowa.

A. FOLIOSA. Habit of the last, with very ample foliage: leaves 2½ inches long, half as broad; umbellate flower clusters all subtended by a pair of well developed leaves like an involucre; flowers smaller than in the last; calyx-tube broader, segments partly subulate, partly exactly lanceolate, all very acute, the longest half as long as the corolla, sinuses open, rather obtuse: segments of corolla with short setaceous point.

Known only from along Vermillion River, northern Ohio; E. L. Moseley, 1898.

A. DIVARICATA. Plant very large, evidently about a yard high, widely and almost divaricately branching, copiously floriferous but the flowers often solitary, or in pairs or threes: calyx the smallest in the genus, with very short tube, and not long subulate and subulate-lanceolate acute teeth, the whole less than one-third the length of the not large corolla, this apparently

little or not at all accrescent over the growing ovary, its teeth hardly more than acute.

Borders of woods about Knoxville, Tenn., A. Ruth, October, 1898. Just this plant is figured in the Botanical Magazine at t. 3496, where the reader of the text accompanying the plate will at first read it as if the representation were that of a plant from New York; and this is true partly, but only as to the uncolored dissections of a flower occupying the base of the plate. At the end Sir William informs us that the drawing of the main figure was by Dr. Short, whose type must naturally have been this southern species, as indeed, it shows for itself on a comparison with specimens. In this plate, also, may be seen just what approach to expansion the *Aloitis* corolla makes at its perfection.

Two New Batrachia.

Batrachium Bakeri. Annual in Californian ponds and pools that go dry in summer: stems a foot long or more, nearly naked below, the lower nodes remote, marked by a solitary simple lance-linear leaf or phyllode; proper foliage rather sparse and small, the submersed leaves with short narrow-linear widely divergent on almost divaricate segments not collapsing when withdrawn from water, the uppermost (perhaps also submersed) with truly filiform or capillary segments, these also rather firm, hardly collapsing; stipules of the uppermost broad, appressed-pubescent: flowers very small: carpels 12 to 20 in a depressed-globose head: styles linear but short.

Pools among the hills of the Coast Range near Stanford University, 8 May, 1902, C. F. Baker, distributed under n. 786. Habitat like that of *A. Lobbii*, and strongly marked by a most peculiar and strikingly usneoid foliage.

Batrachium pedunculare. Stout and low annual, spreading beneath the water in slow streams of the Californian Coast

Range: all the internodes short and whole plant copiously leafy with a capillary-dissected foliage quite exceeding the internodes and not collapsing; peduncles very stout, of half the diameter of the stout branches that bear them, about an inch long, falcate-curved in fruit; petals of the small flowers remarkably long oblong; carpels small, glabrous, sharply keeled and rugulose, tipped with a slender-subulate style and forming a depressed-globose head of about 12 to 20 in each.

Near Lakeport, Lake Co., 9 May, 1902, C. F. Baker: distributed under n. 3062. Remarkable for the stoutness of the whole plant and the prominence of the long thick curved peduncles. Mr. Baker reports that the plants grow singly, not forming masses, in the beds of streams.

Two New Sophiae.

SOPHIA OBTUSA. Evidently large and freely branching, but root and main stem not seen: branches, foliage and calyx canescently stellate-tomentulose: larger leaves simply pinnatifid, their 7 to 11 lobes oblong, obtuse, commonly entire, now and then crenate-serrate; racemes sessile, short and loose in fruit: pale-yellow petals minute, hardly equalling the sepals: pods very slender, straight, more than ½ inch long, torulose, acute, on ascending pedicels of less than ½ inch and almost filiform.

In the Black Range, southern New Mexico, 1904, O. B. Metcalfe, to be distributed under n. 1074.

S. SERRATA. Bright-green and appearing glabrous, but very sparingly and minutely pubescent under a lens: stem-leaves not seen, those of the branches cut into narrow and remote pinnæ all very acute and serrate-incised: racemes sessile, short and dense: sepals glabrous, thin, yellowish, much surpassed by the yellow petals: pods only 4 lines long, on filiform pedicels of ½ inch or more, commonly incurved, acute, very slender, somewhat torulose.

Same region as the above, and by the same collector; his n 1069.

A Proposed New Genus, Anotites.

Never since thirty-five years ago, when I first began to learn the flora of the Rocky Mountains, was I reconciled to the doctrine that what was then, and is still called *Silene Menziesii*, is truly of that genus. There is no member or group of *Silene* with which it comes at all near being at accord, whether viewed as to its habit or characters; and it would be a *Stellaria*—or *Alsine*—but for the fact that its capsule is five-toothed rather than three-valved; and that one character of the capsule alone seems to have determined its place among the Silenes in the book in which it was published; the author at the same time conceding that it was not well in place as a member of that genus. Hooker, as it seems, virtually admitted it to be *sui generis* when, being about to publish it as tentatively a *Silene*, he says: "This species is totally unlike any other with which I am acquainted, somewhat resembling a slender state of *Saponaria ocymoides*; nor indeed does it accord with any of the divisional characters given by Dr. Candolle" (Hook. Fl. Bor. Am. i. 91).

As an excellent generic type, its characteristics may be briefly indicated as follows:

ANOTITES. Perennial herbs of low stature growing singly in tufts, or forming extensive colonies by means of connected long horizontal rootstocks. Leafy stems usually freely dichotomous, the flowers scattered or else in leafy-bracted cymes; the whole habit, inflorescence, and small white flowers those *Alsine* (or *Stellaria*). Petals bifid, without appendages. Capsule subcrustaceous, equalling the calyx, 5-toothed. Seeds small, numerous.

By modes of growth, peculiarities of inflorescence, forms of foliage, characters of pubescence, etc., a number of species bespeak recognition, each from its own geographic and climatic province within a vastly extensive region—almost the whole of far-western North America.

LEAFLETS, VOL. i. pp. 97-112, Oct. 6, 1905.

* Species of the Pacific Coast; British Columbia to California.

+– Pubescence retrorse.

1. A. Menziesii. *Silene Menziesii*, Hook. Fl. i. 90, t. 30. The several stems a foot high or more, firm, nearly upright, loosely leafy and not very many-flowered; leaves oblanceolate to elliptic-lanceolate, acute or acuminate, 1½ to 2 inches long, the internodes as long; stem usually canescent below with a retrorse villous pubescence, this more sparse on the pedicels and branches of the cyme, and interspersed with short spreading gland-tipped hairs; both faces of foliage with a minute and short stiff pubescence mainly retrorse; pedicels an inch long, often not equalling the leaves; calyx delicately hirtellous, its triangular acute or acuminate teeth of more than one-fourth the length of the tube; lobes of the petals linear or oblong-linear, entire.

British Columbia, Washington and Oregon, chiefly or altogether westward and along the seaboard, though there are specimens from Northern Idaho that must also be referred here. Nuttall's *Silene stellaroides* may be distinct from this, but I cannot identify it by his description.

2. A. latifolia. Plants evidently forming colonies through a system of superficially seated not slender rootstocks: stoutish stems only 6 or 8 inches high, very leafy and with a reduced and very leafy cyme: leaves 1½ inches long and twice the length of the internodes, ¾ inch broad above the middle, cuneate-obovate to oblong-obovate and broadly elliptical, cuspidately acute, loosely hirtellous beneath, above almost glabrous, margin runcinate-ciliolate; stem retrorsely pubescent throughout, not even the pedicels with either spreading or glandular hairiness: the few slender pedicels not half the length of the leaves: calyx loosely villous, the oblong-obovate teeth obtusish.

In woods at Yale, B. C. Macoun, 17 May, 1889. U. S. Herb. and Canad. Geol. Surv. n. 61,314.

3. A. viscosa. Tufted stems ascending from a geniculate

base, 6 or 8 inches high, leafy below, the cyme nearly naked: leaves deep green, oblanceolate-elliptic, acute, 1 to 1½ inches long, surpassing the internodes and suberect, both faces somewhat glandular and retrorse-hirtellous: stem clothed throughout with very viscid gland-tipped hairs widely spreading, but the lower internodes with also a minute glandless deflexed pubescence under the other kind: cyme contracted, the short pedicels subtended by small bracts: calyx-teeth deltoid-ovate, merely acute or scarcely so: petals small.

Blue Mountains, Columbia Co., Washington, R. M. Horner, 17 July, 1896; type in U. S. Herb.

4. A. DIFFUSA. Low, diffusely branched from the base, rather rigid, the plant 5 or 6 inches high, 7 to 10 in breath, not depressed, internodes shorter than the leaves, the latter broadly oblanceolate to elliptical, acute, spreading, bright green and glabrous or merely scaberulous above, beneath rough with short retrorse hairs, these more numerous on midvein and margin; lower internodes rather densely retrorse-pubescent, all from the middle parts of the plant upwards as densely glandular-hirtellous only; leafy bracts of the copious inflorescence not small, elliptic-lanceolate, surpassed by the filiform pedicels; mature calyx turbinate, the tube 10-angled; teeth deltoid, acute.

Type specimens in my own herbarium from Sugarloaf Hill, Modoc Co., Calif., 1894; younger material from the same place in 1895; both by Mrs. Austin.

5. A. ALSINOIDES. Low, compact, diffuse, the branches 5 to 8 inches long, very leafy below, floriferous from below the middle, the inflorescence leafy with only small leaves or bracts; stem and branches all weak and slender, retrorsely villous, the pedicels minutely glandular and hirtellous: stem leaves oblong-lanceolate to elliptic, ¾ to 1½ inches long, those of the cyme less than half as large, obovate, all acute, thin, nerveless, glabrous on both faces, marginally retrorse-ciliolate: pedicels very short, mostly of twice the length of the calyx, this large for the plant, hirtellous, the deltoid acutish teeth villous-ciliate: lobes of the petals broad, nearly obovate.

At 8000 feet in the Soldier Mountains, Idaho, L. F. Henderson, 16 July, 1895. U. S. Herb. Species curiously simulating in a degree, the common Chickweed.

+– +– Pubescence spreading.

6. A. COSTATA. Low, stoutish, rather rigidly ascending, much branched and with short internodes twice exceeded by the firm light-green ascending foliage; stem with hirtellous and gland-tipped hairs intermixed, none retrorse: leaves oval to ovate-elliptic, faintly feather-veined, scabro-puberulent above, almost hirtellous beneath, minutely and closely hispid-ciliolate; inflorescence terminal and contracted, pedicels less than ½ inch long: calyx-tube 10-ribbed; teeth ovate-deltoid, acute or acuminate: lobes of petals broad, each with a lateral tooth.

Extreme northern California and adjacent Oregon. Species based primarily on my n. 900 from Yreka as in my own herbarium. I have it also from Butte Co., by Mrs Austin, and Kellogg & Harford's n. 83 from Oregon may in part be referred here. It is the only species in which ten quite prominent ribs occur in place of the usual nerves or angles of the calyx.

7. A. NODOSA. Stems 6 or 8 inches high, much branched dichotomously from toward the base, all the internodes slender but the nodes more than usually swollen, the many flowers borne above the main foliage: leaves 1 to 1½ inches long, firm, spreading, elliptic-lanceolate, acute, sparsely beset on both faces and more closely so on the margin with spreading mostly gland-tipped short hairs, the stems more densely so clothed and with no retrorse pubescence: slender pedicels and rather long calyx viscid-hirtellous, teeth of the latter deltoid and short: corolla large for the plant; lobes of petals oblong, obtuse.

Wenatchee, eastern Washington, in damp ground along Beaver Creek, Kirk Whited, 17 July, 1896, U. S. Herb.

8. A. MACILENTA. Herbage of a vivid green, thin and delicate in texture, but the plants large, a foot high or more, branched from the base, amply leafy and loosely floriferous; the stem with no retrorse pubescence, scantily and delicately hirtellous and

glandular-hairy: leaves very thin but large, elliptic to oblong-lanceolate, 1½ to 3 inches long, acute, sparsely muriculate-punctate above, the points apt to develop short hairs, beneath sparsely soft-hairy, the midvein scantily hirtellous and margin obscurely ciliolate: pedicels filiform, all but the uppermost shorter than their subtending leaves, though more than an inch long: calyx thin, obovoid, deeply cleft, the teeth triangular, acute or acuminate: lobes of the petals oblong: seeds short-reniform, delicately reticulate, the meshes forming an ill defined transverse lineolation.

Moist shades by streams in Eastern Oregon and adjacent Idaho, Leiberg, n. 2443 from Malheur Co., and 867 from Wasco Co., Oregon; but finest specimens by Henderson, Hatwai Creek, Idaho; all as in U. S. Herb.

* * Species of the Great Basin; none with retrorse pubescence.

9. A HALOPHILA. Stems low, 5 to 7 inches high, sparsely floriferous almost from the base, and very leafy throughout, with thin and delicate but ample foliage; leaves obovate-oblong to elliptical, merely acute, 1 to 1¾ inches long, spreading, of nearly twice the length of the internodes, only puncticulate above, beneath with a few short hairs, the margin hispid-ciliolate; lower joints of the stem villous and viscid with spreading hairs, the upper and the pedicels minutely glandular-hairy: calyx large, cleft well toward the middle, the lobes triangular, acuminate: petals apparently small.

Desert plains of southeastern Oregon, near Alkali Lake, H. E. Brown, 30 Sept. 1896, U. S. Herb.

10. A. DORRII. *Silene Dorrii*, Kell. Proc. Calif. Acad. iii. 44 f. 12. Upright, a foot high or less, the slender stems subterete, straw-colored and somewhat shining, only minutely and sparingly hirtellous and glandular, nowhere retrorse-villous, leafy throughout and sparsely floriferous: internodes mostly far longer than the leaves, 1½ to 2 inches long; leaves obovate-

oblong to elliptical, merely acute, thin, light-green, both faces with scattered minute straight hairs, the midvein-beneath and the margins more or less retrorsely hispidulous: calyx strongly 10-nerved, the nerves hirtellous, the teeth long-pointed from a deltoid base.

Exclusively of the Great Basin, chiefly in western Nevada; fine specimens in U. S. Herb. from near Reno, by M. E. Jones, June, 1897; also by L. F. Ward, from Aquarius Plateau, Utah, 29 July, 1875; also at other stations in western Utah by M. E. Jones, in 1894.

* * * Species of the Rocky Mountain region; all with some retrorse pubescence.

11. A. JONESII. Decumbent, widely branching 6 or 8 inches high, the cyme rather distinct but copiously leafy-bracted, lower internodes retrorsely hirtellous (not-villous), all the upper ones clothed with spreading hairs all tipped with an uncommonly large gland: leaves obovate-elliptic to elliptic and elliptic-lanceolate, 1½ to 2 inches long, acute, thin, deep green, conspicuously and closely muriculate-punctate, the points rarely ending in a short hair, both faces usually glabrous, only midvein beneath, and margins uncinate-aculeolate; the ovate and lance-ovate small bracts of the cyme glandular-scabrous, as also the short pedicels and calyx; teeth of the latter deltoid, acute, the tube not strongly nerved.

Mountain districts of northeastern Utah and to middle Colorado and northern Wyoming; the type in U. S. Herb. by M. E. Jones, American Fork Cañon, Utah, 28 July, 1880; fragments of apparently larger specimens from Ogden, 1885, by Letterman.

12. A. BAKERI. Low, slender, diffuse though a little rigid and wiry, the tufted stems 3 to 5 inches, mostly simple up to the small and few-flowered but distinct cyme; internodes short, less than an inch long, rough with short stiff deflexed hairs: leaves longer, spreading or ascending, narrowly oblanceolate, acute or acuminate, more or less muriculate-scabrous, the mid-

vein on both faces, also the margin uncinate-aculeolate: pedicels slender, short, rigid, glandular-hirtellous, as also the narrow calyx, this with deltoid hardly acute teeth: limb of petals only deeply obcordate, the lobes being short and rounded, the base of the limb marked by a pair of small scales representing the crown.

Southern Colorado, Baker, Earle & Tracy, n. 37, Mancos, 1898. Also fine specimens from Middle Park, 1891, by Beardslee & Kofoid, in U. S. Herb., and again by Frank Tweedy, from Ridgway, 1895.

13. A. DISCURRENS. Low, decumbent, forming colonies by an extensive system of rootstocks all connected, the very slender weak stems decumbent or more depressed, very leafy, with internodes much shorter than the long narrow leaves, the lower villous with more or less definitely retrorse hairs, the upper with a firmer viscid spreading pubescence, but gland-tipped hairs wanting or obscure: leaves thin, oblanceolate, acute, 1 to 1½ inches long, sparsely roughish-pubescent or merely puncticulate, but midvein and margin uncinate-hispidulous: flowers very few among the upper leaves, on filiform pedicels not surpassing the foliage: calyx-teeth triangular-lanceolate, almost acuminate: petals bifid, their lobes round-obovate and with a tooth on the side.

Gunnison, Colorado, 23 July, 1901, C. F. Baker, n. 559; also perhaps the same is the Los Pinos plant of Mr. Baker's 1899 collection sent out under n. 312.

14. A. ELLIPTICA. Extensive underground growth as in the last, the rootstocks stouter, less prolific of aerial stems, these mostly simple, 2 to 5 inches high, retrorsely short-pubescent, the uppermost, as well as pedicels and calyx densely viscid-glandular: leaves thin, elliptical, ½ to 1 inch long, acute, smooth and glabrous on both faces, only the margins and midvein beneath beset with very short uncinate hairs: calyx-teeth ovate, obtuse, ciliolate, the subcylindric tube hirtellous-glandular.

Alpine in the mountains of southern Colorado, on Bob Creek, west of Mt. Hesperus, July, 1898, Baker, Earle & Tracy, n. 272 as in my herbarium.

15. A. VILLOSULA. Tufted stems ascending, barely 3 inches high, sparingly branched, few-flowered, the internodes quadrangular whitish-villous with long deflexed hairs; leaves thin, ascending or spreading, 1½ inches long, oblanceolate-elliptic, acute, clothed above with a minute but rather harsh pubescence, beneath especially along the midvein hirsutulous, the margin uncinate-hispidulous: pedicels long, little or not at all surpassing the foliage, villous but not glandular: calyx with hirsutulous tube and deltoid acute teeth.

Dry rocky beds of the Gros Ventre River, Wyoming, 13 Aug. 1881, Dr. W. H. Forwood. Also the same, but less villous, from banks of Wind River, 20 July, same year and same collector; all in U. S. Herb.

16. A. TENERRIMA. Very slender, with thin and delicate light-green foliage and long filiform branches and pedicels, the whole commonly 8 or 10 inches high and upright or ascending: stems quadrangular, above sparsely beset with minute spreading gland-tipped hairs, the lower internodes retrorsely villous: leaves mostly 1½ to 2 inches long, ascending, oblanceolate to nearly elliptic, very acute, sparsely and minutely retrorse-aculeolate on midvein beneath and on margin; pedicels and calyx hirtellous and glandular, the latter narrowly turbinate, cleft deeply, the teeth triangular-lanceolate, acute.

Medicine Hat, Assiniboia, J. M. Macoun, June, 1894, n. 3090, Herb. Geol. Surv.; also by the same on Red Deer River, Alberta, 1881, and young specimens at Blackfoot Crossing, Alberta. In slender habit, delicate herbage and scanty pubescence, this far northern plant invites comparison with the still very dissimilar *A. Dorrii* of Nevada and Utah.

17. A. DEBILIS. Much branched from the base and low, young plants beginning to flower only 3 or 4 inches high, very leafy and deep green, the stems and branches very slender and weak, obviously if not sharply quadrangular and retrorsely aculeolate, only the short lowest internodes somewhat villous retrorsely: leaves narrowly lanceolate to lance-linear, 1 to 1½

inches long, very acute, aculeolate marginally and along midvein beneath, otherwise almost or quite glabrous : only the earliest pedicels seen, these filiform and half the length of the leaves: calyx-tube hirtellous; teeth triangular, acute.

Farewell Creek, Cypress Hills, Assiniboia, J. M. Macoun, 27 June, 1895. Specimens young, but showing very characteristic habit, foliage and pubescence. Seen only in Canad. Geol. Surv. Herb., n. 10124.

18. A. TERETICAULIS. Slender, rather firmly erect, 10 inches high, freely dichotomous from the middle, the inflorescence ample but leafy: stems with no trace of angularity, the lower internodes with but a faint trace of pubescence but that retrorse, all the upper and the pedicels glandular-puberulent: leaves 1 to 1½ inches long, narrowly elliptical, spreading, those of the cyme the same and not much smaller, all sparsely hirtellous on both faces and not more so on the margin : pedicels 1 inch long, filiform : calyx not deeply cleft, the deltoid-ovate teeth abruptly acutish.

Waterton Lake, Alberta, J. M. Macoun, 29 July, 1895, Geol. Surv. n. 10123.

Some New England Persicarias.

Acting upon suggestions made at pages 24 to 50 of these LEAFLETS, Mr. Luman Andrews, of Southington, Connecticut, during the season of 1904, made a collection of perennial Persicarias, such as perhaps no other individual has gathered in a lifetime, viewed from the standpoint of its utility as helping toward the solution of hard problems first shown to exist, and await solution, in the pages just indicated. His gatherings, with the exception of one day's collecting at Springfield, Massachusetts, all were made within the State of Connecticut and near Southington.

To the copiousness of the very admirably made specimens,

Mr. Andrews had added many notes throwing full light upon the habitats and the habits of such of these plants as have been found within his own field of observation. These field notes I shall here print, under quotation marks; having in mind not only their eminent usefulness as helping to understand the forms of *Persicaria* in the Connecticut valley, but also models of field-note making for any who, in other sections of the country, may interest themselves in the study of the group.

P. FLUITANS (Eaton), Greene, Leafl., i. 26. Quite typical specimens, taken from Flander's Pond, Southington, 6 Sept., 1904. Mr. Andrews remarks: "The plants were all growing in the water of an artificial pond, the leaves and stems all floating. Even when starting near the shore, or at the water's edge, they invariably took to the water and not to the shore. There were no muddy-shore plants or indications of them."

This interesting note gives not the least promise of any fulfilment of the prediction which I hazarded in my last paragraph upon this species on page 27.

P. COCCINEA (Muhl.), Greene, Leafl., 35. The straggling riparian state described at the top of page 35 is sent by Mr. Andrews, from about Tyler Pond, Southington, 4 Sept. 1904. "Only one colony, on the border of a small natural pond; the soil a sandy loam. This colony was growing on ground dry at the time, but well within the limits of the water when the pond is at its height. In other years I have known this colony to extend quite around the pond and to flower profusely."

More noteworthy, however, is a series from Springfield, Mass., 18 Aug., 1904, all the plants sterile, the interest centering in some obviously prostrate branches which, by certain familiar characteristics of the leaf, would at first view seem to make it certain that they had been floating leaves. We had hitherto met with no such prostrate branch with aquatic-looking foliage in this common species. But here is Mr. Andrews' distinct attestation that these were not, as he found them, floating leaves: "Shores of water shop pond; some growing on a grassy border, some on the muddy shore; but none were seen in the water

or very near its edge. Those that grew on the muddy shore can easily be recognized." What makes these so readily recognizable is, of course, their smooth and glossy oblong unpointed foliage on elongated petioles; just the contrast one notices between leaves of aquatic and those of terrestrial growth in these plants. Now these branches and foliage are so precisely aquatic, in aspect, that without my correspondent's word to the contrary, I should have believed them to belong to some other plant than *P. coccinea*, which species is not otherwise known to me as having an aquatic state, though in a considerably altered riparian condition it is not rare. Scrutinizing one of the best of these specimens from end to end and leaf by leaf, by aid of a lens, I read its history; and the reading at once verifies my correspondent's statements as to what he saw on a certain day, and yet reveals another fact confirming my strong impression that what I had before me was practically an aquatic branch, at least, as to a part of its growth. The specimen is 10 inches long and has 7 well developed leaves. The 3 leaves occupying the lower half of the stem have all the marks of the aquatic Persicaria. They are perfectly glabrous beneath, even to the midvein, and they have the long slender petioles usual to floating persicaria foliage. These 3 leaves of the branch were developed earlier, and manifestly at a higher stage of the water in the pond, so that for the time this branch and its leaves were floating in shallow water. From the middle of the branch it changes from the horizontal in direction, curving upwards, and its leaves lose one by one that peculiar outline which the aquatic ones have, become more and more like the terrestrial leaf-form, and they acquire as gradually the traces of pubescence, even on the midvein beneath. Here, then, is clearly written the history of a subsidence of the waters of the pond in the later summer, so that what had been aquatic branches with floating leaves, were found to be riparian in the autumnal season.

This aquatic foliage of *P. coccinea* presents some points of clear divergence from that of any other; but I shall reserve the diagnosis for some future time, hoping, meanwhile, for a

repetition in some other locality of Mr. Andrews' very interesting discovery.

P. Novae Angliae, Greene, l. c. 34. This was practically founded on a single Massachusetts specimen, and that without a word or hint on the label, as to either the habitat of the plant, its height, or anything else that would have helped an investigator; but the long petioles, the great size and thin texture of the leaves, together with the absence of pubescence, were characters precluding the idea of its being a state of *P. coccinea*, or of any other recognized species, and so I had to assign it specific rank.

Mr. Andrews collected it from Lily Pond, Southington, 23 Sept., 1904, copiously; and while the specimens were taken late in the season and therefore exhibit a well matured foliage somewhat firmer in texture, and not quite so nearly glabrous, yet in other points the type specimen is perfectly matched in not a few of these; and the collector's account of the strange habitat and extraordinary dimensions of the species tends to confirm it in the rank of a species. There were sent me, for study, 18 sheets of specimens, along with the following information: "All these plants were growing in the water with upright stems, some reclining upon bushes and attaining a height of 4 or 5 feet or more, the bright flowers appearing at the top above the bushes, some nearly 30 or 40 feet from the shore. There was no indication of floating stems or leaves. None were along the muddy shore, but all were growing in the water. The pond is a natural one, with no inlet or outlet, maintained by springs. Its waters are clear, and vary but little in depth throughout the season."

P. Hartwrightii (Gray), Greene, l. c. 46, apparently to include *P. abscissa*, Greene, l. c. Mr. Andrews makes several collections of this, both in flower and sterile. The first of these is from Cusent Lake, at Southington, which is said to be "an artificial lake on trap soil," and the "plants grew in grass land, but within reach of high water." The flowering specimens are remarkable as being destitute of that rim to the ocrea which has been supposed to mark most clearly *P. Hartwrightii*;

but on all the sterile plants it is fairly developed.

The second collection is a copious one, showing wide diversity of foliage, pubescence, and ocrea-rim, and, most welcome of all, some aquatic stems with floating foliage; this a new thing for *P. Hartwrightii.* The locality and conditions are thus described: "Shuttle Meadow Lake is a body of water some 200 acres in extent, owned by the city of New Britain and used for municipal purposes. In one section are several small colonies of this plant, all on dry ground, growing with other vegetation, but within reach of high water. No plants were seen, either on the muddy shores that were two or three rods away, or in the water. You will notice that some of the stems have leaves of a different form, but nothing like the floating leaves of other localities."

In the ample series from this station, while there are flowering stems with well developed herbaceous border to the stipule, there are others in which it is much reduced, and some in which it completely fails; and, while all these Connecticut specimens are much farther from being glabrous than are the originals from the New York habitat, and in so far approach *P. abscissa*, yet I doubt, now, altogether, the validity of that species.

The specimens to which Mr. Andrews adverts as having different leaves were certainly, at an earlier date and when the lake was higher, submersed as to their stems, and the leaves floating; and these leaves that once floated have the long slender petioles and glabrous shining blades usual to this state; but here in *P. Hartwrightii* such foliage tapers to the petiole, instead of being truncate or subcordate as in the aquatic state of every other known to me.

P. Andrewsii. Flowering stems a foot high, upright, but from a prostrate base that takes root at the nodes: leaves ascending on short petioles, not large, mostly 3 or 4 inches long, exactly lanceolate, acute, rather firm, glabrous above, or else scabrous toward the margin, this always scabrous, as also the midvein beneath, with short appressed hair-points; ocreae rimless, rough with a short strigose hairiness: spike mostly solitary,

short, as also its peduncle, this very rough with short strigose points and glandless.

Sterile low riparian state with leaves no larger, thinner, altogether glabrous except us to margin and the midvein beneath, these much less emphatically scabrous than in the flowering plants.

Aquatic state sterile, the floating leaves larger, 4 inches long or more, subcordate-oblong, acutish, glabrous in every part, even marginally; petioles stouter than in aquatic states of other species but 2 inches long.

This is the smallest species of the group that I have seen, as to the height of the land plant, the size of its leaves and also of its spikes. It is even smaller than many of the common annual Persicarias as to foliage, inflorescence, and even as to stem. It is from what Mr. Andrews calls Misery Swamp, near Southington, 21 Sept., 1904, which my correspondent describes as "a wet meadow of possibly six acres, with a small slow stream running through it. This meadow is so wet as to require the use of rubber boots to get about in it; there being many pools of water of varying size, and the land between them very wet. The plants were quite numerous all about the meadow, some standing in the pools of water, some on the drier land, others along the banks of the stream where they often extend down into the water and assume a floating form of stem and leaves. But very few flowers were found."

I must add that under the same cover containing the new species, were a number of sterile stems of *P. Hartwrightii*, showing that this also inhabits the same swamp.

What is Nuttallia Davidiana?

In a lately offered recension of *Osmaronia* (Pitt. v. 309) I made no note of *Nuttallia Davidiana*, not being able to identify it as a species of that genus. The name makes its first appearance in the Kew Index, where it is credited to Baillon;

but this is merely inferential. That author did indeed describe, from insufficient herbarium fragments, what he called "*Exochorda? Davidiana*" (Adansonia, ix. 149), concerning which he said, at a later date (l. c. xi. 328) that it ought to be referred to *Nuttallia*; that the seeds of the shrub as grown in the Paris Garden, and which he had been told had come from Mongolia through the hands of the Abbé David, had really been received from the United States.

Considering the shrub to be a *Nuttallia*, it is evident M. Baillon did not believe it to be the one species up to that time recognized, *N. cerasiformis*; and from the characters assigned the foliage it can not have been that; for the leaves are to be glabrous on both faces, and their margin crenulate. This last character is one of a nature to throw doubt upon the correctness of referring the shrub to the North American genus; for the foliage of ours is entire, though with the exception that in very young leaves of one of the newly proposed species, *O. demissa*, the margin is narrowly revolute and crisped, even appearing somewhat erose. The foliage in M. Baillon's type fragments was that of the flowering period, consequently not half grown. Very possibly, then, *Nuttallia Davidiana* of the Kew Index and my *O. demissa* might be proven identical; but the evidence is wholly insufficient; and so I declined, in my recent paper, to cite the Kew Index name at all.

Three New Heucheras

H. PACHYPODA. Rhizome stout, subligneous, strongly invested by a coat of dead leaf-bases: leaves very small, in a compact tuft, firm, more or less pubescent on both faces, suborbicular, hardly ½ inch broad, the petioles about as long: slender wiry scapes 6 or 8 inches high including the inflorescence, purple, scaberulous and slightly glandular: panicle 3 to 5 inches long, subracemose and more or less definitely unilateral, the few flowered branches remote: calyx somewhat gibbously turbinate,

the tube glandular, this and the oblong obtuse green-tipped segments of about equal length: stamens and petals of about equal length and well exserted.

Lone Pine, Inyo Co., California, 1897, at 7,000 feet; M. E. Jones. Type in U. S. Herb.

H. VERSICOLOR. Rhizome short, stout, fleshy rather than ligneous: leaves all nearly orbicular, slightly longer than broad, the basal sinus open but not rounded, 1¼ to 1¾ inches broad, thin, glabrous above, nearly so beneath, the margin sparsely and unequally setaceous-ciliate; petioles sparsely hirsute: scapes slender, naked, short, bearing the inflorescence only a little, or even not at all, above the foliage, the whole plant, though of large parts, only 6 or 8 inches high; thyrsoid and narrow inflorescence completely unilateral, 3 or 4 inches long, the small bracts simple or trifid, of linear-lanceolate cut, purplish: calyx turbinate, the segments longer than the tube, ovate-oblong, pinkish and green-tipped, after flowering changing to rose red: petals minute or wanting; several stamens apt to be infertile and the filament wide and petaloid.

On damp shady bluffs in the Black Range, New Mexico, 9500 feet, 3 Aug. 1904, O. B. Metcalfe, n 1203. Both these Hencheras are allies of *H. rubescens.*

H. LEPTOMERIA. Rhizome stout, fleshy rather than ligneous, leaves subreniform-orbicular to orbicular or slightly elongated, 1¼ to 1¾ inches broad, glabrous above, sparsely setulose along the veins beneath and around the margin; petioles loosely hirsutulous and minutely glandular: scapes slender, naked, a foot high, glabrous; rachis of the narrow but open panicle and the pedicels sparingly minute-glandular: calyx acute at base and narrowly turbinate, the segments little more than half as long as the tube, ovate-oblong, obtuse: petals as long as the stamens, the blade linear on a long filiform exserted claw.

Organ Mountains, New Mexico, 17 Sept., 1893, E. O. Wooton, as to the type specimens in U. S. Herb. Other specimens, but with stouter peduncles, and calyx a little less narrow, were obtained in the same range of mountains by Mr. Wooton, 1 Sept., 1897.

The Genus Radicula.

It has always been with reluctance, and under a mental protest, that I have in recent years employed the generic name *Roripa*; for I have known that this genus of the yellow water-cresses obtained its first recognition as a type distinct from the common water-cress, with Dillenius; and that this author assigned it the generic name RADICULA (Dill. gen. 121 (1719); Hill. Brit. Herb. 264 (1756); Moench, Meth. 262 (1794). This name, then, by law of priority, is the only name the type can claim under that law; and, as I long since determined to employ this name in a monograph of the North American Cruciferae, which I may hope to issue in no very distant future, the present paper, in which I shall merely indicate the names of our species under the rightful generic caption, will be in nature allied to several others already published in the current volume.

Of course, the " R." initial to each of the following paragraphs stands for RADICULA. When there is occasion to cite *Roripa* its synonym, it will be cited in full.

There is no need of repeating here the species listed under the correct name by Moench.

R. SINUATA.	Nutt. in T. G.	under	*Nasturtium.*
R. SESSIFLORA.	Nutt. l. c.	"	"
R. LYRATA.	Nutt. l. c.	"	"
R. OBTUSA.	Nutt. l. c.	"	"
R. POLYMORPHA.	Nutt. l. c.	"	"
R. LIMOSA.	Nutt. l. c.	"	"
R. CURVISILIQUA.	Hook. Fl.	"	*Sisymbrium.*
R. SPHAEROCARPA.	Gray, Pl. Fendl.	under	*Nasturtium.*
R. CURVIPES.	Greene, Pitt. iii.	"	*Roripa.*
R. OCCIDENTALIS.	Greene, Fl. Fr.	"	*Nasturtium.*
R. DICTYOTA.	Greene, l. c.	"	"
R. MULTICAULIS.	Greene, Pitt. iii.	"	*Roripa*
R. TENERRIMA.	Greene, Eryth. iii.	"	"
R. CALYCINA.	Engelm. Warren Rep.	"	*Nasturtium*

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R. NUTTALLII. Rydb. Fl. Mont. under *Roripa*
R. ALPINA. Rydb. l. c. " "
R. WALTERI. Ell. Sk. under *Sisymbrium.*
R. COLUMBIAE. Howell, Fl. under *Roripa.*
R. PACIFICA. Howell, l. c. " "

Segregates of the Genus Rhus

No taxonomic problem is easier, no fact more thoroughly established, than the identity of the original species, i.e., the type species of the genus *Rhus*; because during more than a dozen centuries before even Tournefort, the species was but one, and that familiar to all writers about plants as the variously useful shrub of the whole Mediterranean region commonly called *Rhus*, but also long before Linnæus written of under the binary name of *Rhus coriaria*, which name he also adopted. The genus was all this while supposed to be monotypical; *Rhus coriaria*, the only *Rhus*. This fact is so easily apparent in bibliography, that there is no room for any controversy as to what is the type of the genus; and neither Tournefort nor Linnæus, with the genus in view, could well have done otherwise than they did in placing it first in the list of species; placing it as the type.

In the seventeenth century the genus received two indubitable accessions from North America in the shrubs now known as *Rhus hirta* and *R glabra*. Nobody questioned or doubted that these were of that genus. But along with these importations from our shores came the Poison Ivy; a type which no authority did at first, or for a long time after, think of as possibly to be associated with *Rhus* congenerically.

Tournefort, before the end of the seventeenth century, proposed for the two forms known to him the rank of a genus, which he very fitly named *Toxicodendron.* Linnaeus suppressed the genus; but Philip Miller promptly restored it; and several more since Miller's time have insisted on its validity as a proper genus, so that now it bids fair for permanent recognition in the taxonomy of coming years.

A recension of the species of TOXICODENDRON is no easy task; so far from easy, I find it one of the most difficult I have hitherto undertaken. The best treatment of the genus extant, as to the early and typical species, is that of Dillenius in 1732. Linnæus twenty years later, as his custom was, reduced the genus to *Rhus* and confused the species. Philip Miller sixteen years after this restored the genus, and also the Dillenian species of it, adding excellent descriptions of two or three new ones. In these two classic revisions of Tournefort's TOXICODENDRON, and not at all in Linnæus, lie the means of identifying all the species early recognized.

The following represents my present understanding of the names and principal syonymy of the known species.

T. VULGARE, Mill. Dict:(1768); Moench, Meth. 73 (1794.)

Hedera trifolia Canadensis, Cornut. Canad. 96. Toxicodendron vulgare latifolium, Dill. Elth. 389 (1732).

Rhus radicans, Linn. in part. excel. vars. β or γ; Small, Fl. 727 in part.

This type species of the genus will have to rest, in the future, as it did with Tournefort, with Dillenius, with Linnæus and and with Philip Miller, on Cornut's Hedera or trifolia Canadensis, of which the Cornutian description is fair, and the figure excellent. According to all the authors down to and including Miller, it is a shrub that is often upright and rootless above ground, but sometimes fixing itself to rocks, walls and fences, though never climbing high on trees; its leaflets ovate, perfectly entire, glabrous, or very nearly so; always with a large fruit and this peculiarly depressed-globose, being distinctly broader, even by its least diameter, than high. This last character is clearly brought out in Cornut's plate, though I am to be the first to mention this mark; and there is no other species in which this fact holds.

Miller seems to have declined to adopt for this the Linnæan name *radicans*. There were two reasons for this course. The Linnæan "species" was an aggregate of three or more; and Dillenius' name *vulgare* had priority in its favor. In Miller's early day they had not learned that the law of priority was a dead letter anterior to the year 1753.

I must not be understood as reasserting the statements of early authors that in *T. vulgare* the leaflets are always entire. In the herbaria they are shown to be prevailingly so, but with occasionally entire and somewhat toothed leaflets on the same branch, or on the same leaf.

T. vulgare seems to be the common species in Canada, New York and New England, extending also both southward in the mountains, and westward toward the valley of the Mississippi.

T. GLABRUM, Mill. l. c.

Toxicodendron rectum, foliis minoribus glabris, Dill. Elth. 389, t. 291. Rhus radicans var. γ. Linn. Sp. 266.

According to both Dillenius and Miller this is a shrub with strictly upright stems, never rooting or attaching themselves to any support, and with a foliage smaller and leaflets narrower than in *T. vulgare*. It is not always low. With Miller it grew to the height of 6 or 7 feet. It should be distinguished from *T. vulgare* by these marks and by its small fruits more nearly globose, not at all depressed-globose, and by being cuspidate-mucronate.

The habitat of *T. glabrum* is probably northeastern, and that of *T. vulgare* approximately or altogether the same. From the name *glabrum* alone, the authors of the Kew Index seem to have inferred—but very erroneously—that this must be a synonym of *Rhus glabra*, Linn. They might have escaped this error either by reading Miller's description of *T. glabrum*, or by consulting his account of *Rhus* in the same volume; for the real *R. glabrum* is found in its place and with that name.

T. PUBESCENS, Mill. Dict. (1768), excluding the synonym "T. triphyllum glabrum, Tourn.," also Moench, Meth. 73.

Rhus Toxicodendron, Linn. Sp. 266, hardly of Small, Fl. 727.

A common shrub of the northern and middle Atlantic states, distinguished from both the foregoing by its more constantly sinuate-lobed leaflets, perhaps, but by the hirsute pubescence of the growing parts, especially of the leaves along the veins beneath. It is plain that Miller inadvertently cited the wrong Tournefortian species under his *T. pubescens*. It should have been—and I doubt not he meant it to be—not the first but the

second of the two Tournefortian species, the one quoted by Linnæus himself under *R. Toxicodendron*, of which species Miller's *T. pubescens* is meant to be an exact synonym. He was unable to perpetrate a duplicate binary name; and I also leave that task to whomsoever it may be a welcome one. That the species is to be identified with some dwarf plant of the southern seaboard (see Small, Fl. 727) is a proposition for which I can find no warrant. Miller, whose knowledge of these shrubs was far more perfect than that of Linnæus, says that the present species "grows naturally in many parts of North America;" also that it is among the larger kinds. Even Linnæus gave it a range from Virginia to Canada.

T. Rydbergii. *Rhus Rydbergii*, Small, in Rydb. Fl. Mont. 268, in part. Well distinguished by Mr. Small, for the plant of Montana, occurring in Wyoming, mountain districts of Colorado, southward even to New Mexico, apparently, but hardly including that of Washington and Oregon.

T. macrocarpum Apparently low, upright, not very stout, the small leaves on slender elongated petioles, all parts wholly glabrous: leaflets subequal, small, the terminal one with petiolule more than ½ inch long, the laterals almost subsessile, all three of equal size and ovate, either abruptly acute or subtruncate at base, acute at apex, entire or with a few coarse teeth, the largest not exceeding 2 inches long, of a light dull green and a firm texture: panicles small and reduced to little more than a simple raceme, not erect, the rachis being slender and the fruits, though few, the largest in the genus almost exactly globose, the epicarp uncommonly thin and fragile, not wrinkled, almost free from the usual striæ.

Known only from extreme Western Kansas well upon the arid region of the Rocky Mountain basal plain; the type specimens in U. S. Herb. from near Syracuse, 11 July, 1893, by C. H. Thompson.

T. Negundo. Branches of the season red-brown and hirtellous, the older dark-brown, glabrate, closely and minutely lenticellate: leaves very large, the terminal 5 or 6 inches long, 3 to 5 in breadth, ovate, abruptly acuminate, with a few coarse

teeth or small lobes about midway, otherwise quite entire, dark green above and there glabrous except a minute but rather dense curled pubescence on all primary veins, beneath paler, the veins by no means sparsely hirsute with straight and rather coarse spreading hairs: fruits uncommonly small, subglobose but the length distinctly greater than the thickness, not umbilicate, capitellate-mucronate, very smooth and shining, neither obviously striate nor wrinkled.

Low woods in Riley Co., Kansas, J. B. Norton, 28 Sept., 1895, as in U. S. Herb., a fine fruiting specimen; also the same in flower, from the same station, 1896, the date not given. Fine species with altogether peculiar small fruit, and very large foliage strongly recalling that of *Negundo.*

T. LONGIPES. Leafy branches reddish loosely puberulent and obviously lenticellate, the older brown, glabrous and the lenticels obscure: leaves small, on remarkably elongated petioles, these very firm and erect, 4 to 5 inches long, the length of the leaflets less than 2 inches, the terminal mostly on a petiolule conspicuously shorter than that of the laterals, all the leaflets broadly ovate, cuspidately acute, coarsely and quite regularly serrate-dentate from near the base up to the apical cusp, dull pale green on both faces, wholly glabrous beneath, almost so above, but with a few strigose hairs on the surface, becoming more numerous at the margin: fruits of middle size, spherical, neither striate nor wrinkled nor shining but straw-colored and unpolished.

Species from a cañon south of Glenwood, Utah, collected by L. F. Ward, 12 June, 1875, as in U. S. Herb., and a remarkable one in respect to characters both of foliage and fruit.

T. HESPERIUM. Stems and foliage in every way twice the size of those of *T. Rydbergii*, the petioles greatly elongated: branches of a fine pinkish brown the first season, glabrous or nearly so, striate-angled, closely and finely lenticellate: leaves of very firm texture and vivid-green, the leaflets commonly round-ovate, 3 or 4 inches long, 2 or 3 in width, subtruncate or rounded at base, cuspidately acute, either quite entire or coarsely toothed, the teeth more often inclining to crenate than serrate,

the upper face glabrous, the lower also except a few hirsute hairs along the larger veins: fruits large but not of the largest, distinctly round-oval, even almost acutish at summit, shining, striate but not wrinkled.

The common, and, perhaps, the only member of this group in eastern Oregon, Washington and adjacent Idaho, the type being Kirk Whited's n. 241 from Wenatchee, Washington, 16 Aug. 1896, as in U. S. Herb. When *T. Rydbergii* approaches the dimensions of this, as it rarely does, it is readily distinguished by two characters of its fruits, for they are globular, not ovoid, and are turgid and strongly wrinkled irregularly instead of being smooth and striate.

T. DIVERSILOBUM. *Rhus diversiloba*, Torr. & Gray, Fl. i 218. This represents a peculiar type of *Toxicodendron* belonging exclusively to the Pacific coast. The leaflets and their lobes are in general rounded and obtuse rather than angular and acute; the panicles in the original as well as in most of the specific segregates, lax and pendulous, each fruit suspended on a rather long and slender pedicel.

But several inland species have their panicles as rigidly erect as in the Atlantic type of the genus. Typical *T. diversilobum* is from the lower Columbia, and is figured well in Hooker's Flora. The species seems to extend along the seaboard southward throughout western Oregon and California to about Monterey, exhibiting much diversity as to the lobing of the leaf, though the general outline of it remains the same. But south of Monterey other well defined species appear, and still more of them away inland among the mountains bordering arid regions in California, Oregon and Washington. Some of these, of which fair specimens occur in the herbaria, are here named and defined.

T. LOBADIOIDES. Evidently upright, stout, not angular, the bark of growing branches velvety-puberulent, of the older glab rate, lenticellate: leaflets all round-ovate, acute, evenly serrate above the middle, below it entire, 1½ to 2 inches long, 1 to 1¼ inches wide in the middle, dark green and with scattered appressed hair-points above, beneath paler and more or less hairy

along the veins: flower-clusters many, simple and racemose, or slightly panicled; fruiting panicles spreading but not pendulous or even nodding: fruit not seen.

A remarkable species, as seeming ambiguous between the Atlantic and Pacific types of the genus. Mr. Suksdorf, who collects it in rocky places along the Columbia east of the Cascades, and therefore on the borders of the arid region, distributes it for "*R. diversiloba*," which it certainly is far from being. Its foliage is that of *Lobadium*, i. e. *Schmaltzia*.

T. CORIACEUM. Very stout rigidly upright stems minutely and sparsely puberulent and minutely lenticellate: leaves subcoriaceous or almost hard-coriaceous, dark olive green, pale beneath, both faces almost or quite glabrous; leaflets very large, ovate to round-ovate, obtuse or acutish, usually quite entire, only here and there a leaflet with a serrate tooth or two on one side, the largest and broadest 2½ inches long, 2¼ inches broad, none much shorter and none narrow: panicles merely ascending, the branches and pedicels short and rigid: fruits of the largest, depressed-globose; epicarp polished and striate, and under a lens minutely, sparsely, but distinctly hispidulous.

A single excellent specimen in U. S. Herb. exhibits all the above pronounced specific characters. Its home must be at least on the borders of arid eastern Washington, where it was collected by Mr. Suksdorf in 1885, but just where, the label fails to indicate.

T. COMAROPHYLLUM. Stems upright, leafy branches light red-brown, obscurely puberulent, well marked with small elliptic lenticels: leaflets obovate-deltoid, the terminal 1 or 2 inches long and petiolulate, the laterals half as large, sessile, all entire except around and across the nearly truncate apex which is almost as broad as the leaflet's length, here crenate-toothed, the upper face dark-green, the lower pale, both glabrous: fruit in loose pendulous clusters both notably compressed and elongated, being round-oval, but obtuse, the epicarp very thin and fragile, delicately puberulent: putamen strongly striate.

From Tighe's, near San Diego, Calif., Dr. Edw. Palmer, 1875. The inverse-deltoid leaflets, dentate across the summit, are much like those of most strawberry leaflets; hence the name.

T. ISOPHYLLUM. Stoutish upright striate stems velvety-puberulent not only the first but also the second and third seasons: leaves palmately trifoliolate, the leaflets being equal in size and all three sessile, 1 to 1½ inches long, of somewhat obovate general contour but pinnately sinuate-lobed, the rounded lobes not deep, but in about 3 always opposite pairs, dark green above, yet dull and with a glaucous hue, paler beneath, with very few and scattered appressed hair points on both faces, but between the veins, not along them: fruits small, the epicarp not polished but dull and muriculate-punctate as well as somewhat pubescent, the roundish but notably compressed putamen ribbed and striated.

River banks near San Jacinto in southern California, 9 March, 1898, J. B. Leiberg, n. 3117 as in U. S. Herb Most distinct from all others by the sessile terminal leaflet; the lobing also not imitated by any other forms in the *T. diversilobum* aggregate.

T. OXYCARPUM. Twigs smooth, free from angles and lenticels, slightly puberulent: leaves thin, very large, the terminal leaflet 3 to 4½ inches long, oval, coarsely and evenly crenate-lobed, the laterals smaller, inquilateral, entire on the narrower side, on the other lobed like the terminal, deep green and glabrous above, beneath paler, with a few hirtellous hairs along the veins and on the margin: inflorescence paniculate but the branches of it only two or three and very short: fruit on slender pedicels and pendulous, notably compressed and of singularly oblique-rhomboid outline, tapering turbinately from above the middle to the base, the upper part more abruptly acute, epicarp not striate, but irregularly sharply and deeply wrinkled, minutely hirtellous-puberulent.

Vicinity of Santa Cruz, Calif., July, 1884, John Ball; type in U. S. Herb. Also from the Salinas Valley, back of Monterey, Aug., 1880, G. R. Vasey. I suspect the shrub of having the climbing habit. Its habitat is in the redwood forest.

T. DRYOPHILUM. Dendrophilous, climbing trees to the height of 20 feet: branches puberulent, knotted by salient protuberances under the insertion of the leaves; foliage large, 6 to

8 inches from the base of petiole to apex of terminal leaflet, the leaflet 2½ to 4 inches long, often 3 in width, of oval or ovate outline, coarsely but not deeply crenate-lobed but the lobes all abruptly acutish, the texture thin even in autumnal maturity, of a deep rich green above, paler beneath and with slight pubescence along the veins: inflorescence a simple raceme in the axil of every leaf, never panicled, the fruits seldom more than 2 or 3 to each raceme, but pedicels slender and drooping: striae of fruit indistinct, obscured by a strong very irregular wrinkling of the whole epicarp.

Little Chico Creek, Butte Co. Calif., Mrs. R. M. Austin, 1896, both early summer and late autumnal specimens, reported to sustain itself to the height of 20 feet on oak trees.

T. VACCARUM. Stems slender, upright, the branchlets not striate, obviously knotted by small infrapetiolar protuberances, densely puberulent: leaves of the smallest, the leaflets from ¾ to 1 inch long, rather deeply and angularly 5-lobed, dark green and glabrous above, paler and pubescent beneath especially along the veins: inflorescence a simple ascending and rather long raceme in the axil of each leaf: staminate flowers very small, with short subquadrate anthers on still shorter filaments: fruit unknown.

Cow Creek Mountains, Shasta Co. Calif., Baker & Nutting, 1894. This shrub can be compared with no other species of the genus. It is unequivocally of the *diversilobum* group, but, with its long slender upright racemes of small flowers, and its sharply angled foliage, it looks more like a currant bush.

T. DIVARICATUM. Branches only sparsely leafy, elongated and curved, the shrub, perhaps, reclining or trailing but not rooting, the bark greenish-gray, minutely hirtellous: leaves elongated and long-stalked, the whole 6 to 10 inches long; leaflets subcoriaceous, entire, deep-green and glabrous above, beneath with villous midvein but otherwise nearly glabrous, the terminal ovate, acuminate, 2 to 4 inches long, the pair remote from it, smaller, very inequilateral: panicles small, sessile, neither erect nor ascending but spreading divaricately: fruits very small, depressed-globose: epicarp polished, not wrinkled, only faintly striate,

A Lower Californian species, collected by Purpus and distributed for a variety of *T. diversiloba*, to which it is in no wise related. It may represent a Mexican type of the genus, and one farther removed from the Californian type than is even Atlantic slope *Toxicodendron*.

T. PHASEOLOIDES. Akin to the last, but at least sometimes rooting at the nodes and climbing, the internodes not elongated but leaves and flower-clusters approximate: leaflets rhombic-lanceolate, abruptly acuminate, entire or coarsely dentate: panicles short, ascending: fruits larger, spherical, not depressed.

Turucahi, Sonora, Mexico, C. V. Hartman, n. 102, of the 1894, collection, as in U. S. Herb. No. 589 of the same collection, from St. Diego, 1891, is probably the same.

T. LAETEVIRENS. Stems long and slender, not upright, more or less geniculate, rooting at some nodes, the bark light gray, puberulent: foliage copious, large, of a peculiarly vivid light-green: leaflets thin, ovate-lanceolate to lanceolate, acuminate but the very apex obtuse, entire or more or less plainly sinuate-lobed, the terminal 2 to 3 inches long, the laterals shorter and unequal-sided, both faces glabrous but the petioles pubescent: panicles slender, ample and many-flowered, erect or ascending: fruit unknown.

Santo Catalina Mountains, Arizona, 5 May, 1894, J. W. Toumey.

T. ARIZONICUM. Slender as the last, the branches tortuous but not geniculate, neither showing only aerial roots: leaves larger, dark green, firm and subcoriaceous, the leaflets elongated-oval, abruptly tapering to an apex, nevertheless, very obtuse, the terminal 2½ to 4½ inches long, the pair not very inequilateral, all entire, glabrous above, hirtellous along the veins beneath but hardly as to the petiolules: panicles small, seldom of much more than one raceme: fruit unknown.

Fort Huachuca, Ariz., spring of 1890, Dr. Edw. Palmer.

T. EXIMIUM. Branches long, slightly tortuous, evidently more or less reclining, only the growing parts seen, these not striate, greenish-gray, velvety-puberulent: leaves 5 or 8 inches long, rather short-petioled; terminal leaflet 2½ to 3½ inches long,

of ovate circumscription above an abruptly tapering base, usually deeply and incisely 3-lobed, the lobes sinuate-lobed, the pair of leaflets little smaller, inequilateral, mostly 2-lobed on the broader side only, rarely 3-lobed, all of a rich deep green above and sparsely strigulose, beneath pale and with an obscure scattered less strigose superficial pubescence, but all the veins distinctly hirtellous: inflorescence a well developed panicle in each axil, much shorter than the leaves and standing out from them almost divaricately: fruit unknown.

Climbing or trailing our trees shrubs and volcanic rocks at Nombre de Dios, 40 miles south of Durango, Mexico, as collected by Dr. Edw. Palmer, April, 1896; distr. n. 106.

T. BITERNATUM. Allied to the last, more slender, the branches puberulent and striate; leaves as large, somewhat biternate, the terminal leaflets 3-parted and the divisions all deeply and sinuately 3 to 5-lobed, even the pair nearly as much subdivided, both faces minutely strigulose, the veins beneath minutely hirtellous: panicles very small, few-fruited the fruits small, depressed-globose, only faintly striate.

Eagle's Nest on the Rio Grande, western Texas, V. Havard, in U. S. Herb., sheet 156,164; no date given. Very beautiful almost twice-ternate and compound-looking foliage.

T. VERRUCOSUM. *Rhus verrucosum*, Scheele, Linnæa, xxi. 592. A lobed-leaved species of western Texas, evidently good notwithstanding that the warts on the leaves of some specimens, which suggested the name, are accidental.

T. PUMILUM. Dwarf, erect, simple or rarely with a short branch or two, only 6 or 8 inches high, striate-angled, cinereous and glabrous at maturity: leaflets ovate, coarsely toothed, acute or abruptly acuminate, pubescent on both faces but only on the primary veins and toward the margin: panicles numerous, small and quite simple, not rarely reduced to a mere raceme, in fruit not erect but decidedly nodding: fruits large for the plant, exactly spherical, the epicarp greenish-white, scarcely polished, not obviously either striate or wrinkled.

In higher mountains of northern Arizona not far from Flagstaff, June, 1898, D. T. MacDougal, n. 28 as in U. S. Herb.,

labelled *R. diversiloba,* though the plant, despite its inclining panicles is strictly of the Atlantic type of the genus.

T. PUNCTATUM. Stems stoutish, rigidly erect, of light reddish brown, glabrous, dotted very conspicuously with small elliptic lenticels: leaflets of a vivid green on both faces, of firm texture, all three alike in form and nearly so in size, broadly ovate, abruptly acuminate, sparingly and coarsely serrate-toothed in the middle, glabrous above, beneath hirtellous by tufts in and near the axils of midveins and veins, otherwise scantily short-hairy: panicles short and dense, erect: fruit rather large, strongly depressed-globose, umbilicate at summit, many-sulcate, glabrous and shining.

Type O. B. Metcalfe's n. 1088, from the Black Range of mountains in southern New Mexico, 1904; distributed as *Rhus Rydbergii,* from which it is very clearly distinct.

T. ABORIGINUM. Mode of growth not known: leafy branches slender, striate-angled, minutely lenticellate, glabrous: leaves large, 7 to 9 inches long; terminal leaflet ovate, 3 to 5 inches long, obtusish at base, abruptly apiculate, the laterals similar, smaller, strongly unequilateral, all entire, thin, nearly glabrous above, villous-hirtellous beneath along the primary veins: panicles small, dense, sessile: fruit small, nearly spherical, a trifle longer than broad, neither striate nor sulcate, sparsely muriculate, deeply irregular and sharply wrinkled.

Collected at the Choctaw Agency on Lieut. Whipple's expedition, by Dr. J. M. Bigelow in 1853, type in U. S. Herb. No *Rhus* of this group is catalogued in Whipple's Report.

T. RHOMBOIDEUM. *Rhus rhomboidea,* Small, Fl. 727.

T. GONIOCARPUM. Tall climber, rooting freely: branches slender, sharply angled, obscurely puberulent: leaves large. on slender elongated petioles, the leaflets thin, approximate, the terminal ovate, 3 or 4 inches long, tapering abruptly at base, at apex is abruptly short-pointed, entire or with several shallow crenate lobes in the middle, above puberulent along the veins, sparsely hispidulous between them, beneath only hispidulous and chiefly so along the veins: panicles and fruits both small, the pedicels of the latter divaricate: fruit round-ovoid, very

sparsely hispidulous, not in the least sulcate or stri butate deeply, irregularly and sharply somewhat favose-wrinkled.

Lake City, Florida, 25 June, 1901, Lucia McCulloch in U. S. Herb. Species in foliage not unlike that of the common *T. pubescens*, but by inflorescence and fruits most distinct.

T. BLODGETTII. *Rhus Blodgettii*, Kearney, Bull. Torr. Club. xxi. 486.

T. COMPACTUM. Shrub apparently low and erect; branches when young villous-tomentulose, as also the stout rigid ascending petioles of the leaves: leaflets very large, the terminal 3½ inches long, 2½ to 3 inches broad, of slightly obovate outline but very strongly 3 to 5 lobed, the lobes shallow but broad and obtuse, the pair smaller but similar, all of firm texture, deep green, sparsely pubescent above with short curved hairs, beneath similarly so, with also a denser hirsute hairiness on the primary veins: panicles short and very dense in fruit, numerous and closely approximate, the whole fruiting branch concealed by the crowded fruit-clusters: fruit large, narrowly and deeply sulcate, quite spherical, densely hirtellous, not polished.

Species of good characters and remarkable aspect, seen in but one sheet in U. S. Herb., from Woodlawn, Va., by William Hunter, Aug., 1899. The leaflets as to form, texture and color recall strongly those of some oaks of the black oak series; though the lobes are all obtuse.

T. MONTICOLA. Low, erect, not rooting above ground, rather slender, the mere stem only 8 or 10 inches high, but the large foliage, including the greatly elongated petioles, adding 6 to 8 inches more to the height of the plant, the stem sharply angled, scantily puberulent, not lenticellate: leaflets of ovate or oval rather than obovate outline, all sinuately and deeply 5-lobed, the lobes very obtuse, the terminal leaflet 2½ to 3½ inches long, the others smaller, all of firm texture, bright green, minutely reticulate, faintly marked above with scattered short curved hairs, beneath more densely so, even the stronger pubescence of the veins short and curved rather than hirtellous: fruits in small sessile glomerules rather than panicles, each rather large, round but subpyriform, sulcate-striate, dotted with a muriculate tuberculation, but hardly pubescent.

Lookout Mountain, Georgia, July, 1898, Albert Ruth, n. 356 as in U. S. Herb. Perhaps a more pubescent form, with somewhat doubly lobed leaflets, is Percy Wilson's n. 155 from Taylor's Ridge, also in the mountains of northwestern Georgia.

T. QUERCIFOLIUM. *Rhus quercifolia*, Steud. Nom. 1 ed. 689. Habit of the last two, the leaflets quite as strongly lobed, but angularly and acutely so; fruits of the largest, in short glomerules or racemes, depressed-globose, polished and nearly glabrous.

Inhabits the coastal plain, mostly in pine barrens, from Delaware to Florida; excellent specimens in U. S. Herb. from Laurel, Del., Commons; Salisbury, Md.; Chickering; Cape Henry, Va., Kearney; Wilmington, N. C. McCarthy. This doubtless coastal plant is typical for the var. *quercifolia* of Michaux. Its leaflets are patterned always after the black-oak type, i. e. are acutangular, while in both *T. compactum* and *monticola* they have sinuate and rounded lobes, imitating the white-oak type in that respect, though not in color.

T. ORIENTALE. Branches stout, strongly angular, ferruginous-tomentulose the first season, afterwards glabrate, lenticellate: leaflets, large, the terminal one on a short petiolule, broadly ovate, cuspidately acute, entire, commonly 4 or 5 inches long, 3 or 4 in width, deep green on both faces, glabrous above, also beneath except in axils of midvein, these strongly hirsute: panicles short, divaricately branched; flowers large, petals not nervose as in American species: fruit large, globose; epicarp thinner than in any American species, fragile, striate, sparsely muriculate, setose-hispid about the apex when immature.

The Japanese so-called *Rhus Toxicodendron* is in several particulars so different from any and all New World species that it forms a fair subgenus; yet I can not discover that it has ever been indicated as a variety, not to say species; though I can hardly see how this neglect was possible, and fear the above name may prove a synonym. My type is on sheet 19548, U. S. Herb., from Hakodate, 1862, by Maximowicz.

No shrubs that have been referred to *Rhus* are more foreign to that type than those that have been called the Sweet Sumach. They have a watery juice and their twigs and foliage are aromatic and wholly innocuous to the touch. Their flowers appear before the leaves, and from ament-like spiciform clusters imbricate like those of a birch, alder or hazel, and like those they are formed in late summer to remain dormant until spring. Their floral structure is as unlike that of *Rhus* or of *Toxicodendron.*

The first species to be seen in Europe was published by Philip Miller, under whose nurture the bush had grown in the Chelsea garden, as a species of *Toxicodendron.* The same was afterwards named as *Betula* by Thunberg. Rafinesque in 1808 made it the type of a new genus to be called *Turpinia*; this at just about the time when several other botanists were dedicating each a genus *Turpinia.* Rafinesque's genus of that name proved to be other than the first; and, before he found this out, and, before he had published the genus with good character and the well formed and euphonions name *Lobadium,* Desvaux had got into print the wretched barbarism, *Schmaltzia,* supposed to be dedicated to Rafinesque, who sometimes wrote his name Rafinesque-Schmaltz. That this name was not only ill sounding and barbaric, but also on the whole untrue to Rafinesque, and published obscurely, without a character, are three circumstances which must have availed with De Candolle, Asa Gray, and others for the recognition of *Lobadium* rather than *Schmaltzia* as the name to be perpetuated.

To the specific characters in SCHMALTZIA no attention seems to have been given since Nuttall's time, and our herbaria are replete with specific types not hitherto characterized. A considerable number of such are herein briefly defined, while others remain to await further study.

S. CRENATA. *Toxicodendron crenatum,* Mill. Dict. n. 5. *Rhus suaveoleus,* Ait. Kew. i. 368. All stems and twigs, even the growing ones perfectly glabrous, smooth, reddish brown: foliage large, thin, vivid green and almost shining above, paler beneath and to the unaided eye glabrous throughout, a lens disclosing minute hair-tufts in axils of veins beneath, as also at some of the marginal sinuses, and a few scattered hairs along the

veins and the margin; terminal leaflet cuneate-obovate, acute, 2½ inches long, 1⅔ wide, acute at apex, subserrate-crenate above the middle; laterals similar, half as large: fruits of middle size, granular, hirsutulous but rather thinly so.

A shrub of middle Georgia, collected by Harper, Ashe and others; the type here described being Mr. Harper's n. 1329 as in U. S. Herb., said to inhabit dry woods. It is the only member of the genus on the Atlantic slope which answers to Miller's *Toxicodendron crenatum* and Aiton's *Rhus suaveolens* by being glabrous and its herbage of a sweet odor. Miller, by the way, compares its fragrance to that of orange peel.

In Catesby's time and later Miller imported plants from the Carolinas and Georgia, and not only from the coastal plain but from the mountains of the interior. His sweet sumach, it is practically certain, must have been this *R. suaveolens*, Ait. so long suppressed.

S. AROMATICA (Ait.), Small, Fl. This type species of the genus was imported into the Kew Garden in 1772, from Carolina, through Bartram's agency. It is said by Aiton to be distinguished from the above by broader leaflets that are not glabrous but somewhat pilose. Quite such a shrub is more or less common all the way from Alabama to Maryland, over which territory it may prove to run into several more or less perfectly defined subspecies; but all I here wish to indicate is, the important fact that both the Aitonian species are southern, even Carolinian.

It may be well to say at this point, that Marshall's *Rhus Canadensis* is not referable to either of the above. It may be one of the next subjoined species; but it is not possible to identify it, no pretense even to a specific character having been given by that author. We are told it is Canadian, and that is all.

S. SERRATA. Branches and twigs, even when young and growing, glabrous as in *S. crenata:* petioles pubescent on the upper side, as well as both faces of the foliage at all stages, the

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upper face little so in maturity: terminal leaflet cuneate-obovate, acute, the margin from the middle part upwards cut into about 4 subserrate coarse teeth on each side; laterals smaller, ovate or ovate-oblong 3-toothed on one side, 1-toothed on the other: spikes 3 at each axil of one or two upper leaves, each 3 raised on a distinct peduncuIiform twig; bracts glabrous except marginally: fruits small, scarcely compressed, hirsute.

Of northern New York and adjacent Canada, so far as known; my type for foliage, inflorescence and growing twigs being from Jones' Falls, Ontario, 26 May, 1891, by J. Fowler, as in U. S. Herb. A sheet in my own herbarium, collected at Henderson, N. Y., Aug. 1896, by Mr. Tidestrom, is in good fruit.

S. CRATAEGIFOLIA. Evidently low, with rigid short spreading branches always glabrous, even when growing: foliage subcoriaceous, deep green and minutely pubescent above, paler and softly villous beneath; terminal leaflet broadly obovate, obtuse, 1½ inches long, 1¼ broad above the middle, below the middle entire but broad and not cuneate, only acute at base, the upper one-half coarsely crenate-dentate; the lateral leaflets half as large, obtuse at base and crenate or dentate all around the margin: fruit small and in small scattered clusters, sparsely hirsute.

North Pownal, Vermont, 25 July, 1898, W. Eggleston, n. 172 as in U. S. Herb. Of firmer foliage than any other northern species, the leaflets strikingly like the leaves of several North American species of *Crataegus.*

S. ARENARIA. Low shrub with erect rather simple branches delicately puberulent the first season, later dark red-brown, glabrous: leaves small, thin, minutely strigulose-pubescent on both faces; terminal leaflet 1 to ½ inches long, narrowly obovate, not notably cuneate, the summit with one terminal, and on each side two lateral rounded lobes, the lateral leaflets similar but smaller: spikes 8 to 10, one at each node of all the upper part of the stem, which thus becomes a kind of elongated compound spike; bracts glabrous on the back, ciliate: fruits small, densely hirsute.

Sand dunes along the southern shores of Lake Michigan, the type in U. S. Herb., from Clarke, Indiana, 1897, by L. M. Umbach.

S. ILLINOENSIS. Evidently a larger shrub freely branching, the twigs pubescent: foliage scantily pubescent above, beneath almost villous-tomentulose, along the veins fairly hirsute: terminal leaflet 2½ inches long, rhombic-ovate, cuneate and entire at base, above this each margin evenly and very obtusely 5 to 7-crenate, the pair 3-crenate on one side, 5-crenate on the other: bracts of the several spikes tomentulose-ciliate, the back glabrous:

This is a shrub of central Illinois represented in U. S. Herb. as collected by Dr. Brendel in 1878.

S. FORMOSA. Branches glabrous except a few scattered pilose hairs, but foliage villous-strigose on both faces, the veins beneath hirsute: terminal leaflet 2 inches long, ovate and acute above a very short and abrupt cuneate base, each margin very evenly and beautifully 8 to 10-crenate, laterals smaller, hardly inequilateral, rounded at the sessile base, subserrate-crenate on both margins: fruits very large, hirsute.

Sandy woods at Cobden, extreme southern Illinois, 8 June, 1885, M. B. Waite. Shrub with beautiful foliage strongly characteristic. The locality is noted as that of a number of local species.

S. SEROTINA. Growing twigs delicately puberulent, the mature glabrous: foliage in maturity vivid green and somewhat shining as if glabrous, under a lens seen to bear scattered short hairs everywhere, the veins quite pubescent on both faces; terminal leaflet 2 inches long or more, 1½ wide, cuneate-obovate, obtuse, each margin above the middle with 2 or 3 broad shallow crenate lobes each crenate-toothed, the pair much smaller, round-oval very obtuse and obtusely crenate: spikes short, thyrsoidly congested near the ends of the twigs; flowers appearing late, with the foliage almost full-grown: fruit hirsute.

Species of western Missouri, remarkable among Atlantic slope species on account of its late time of flowering. It has been distributed by B. F. Bush, from Independence (in flower) and from Eagle Rock (in fruit).

S. Nortonii. Branches glabrate and sparsely lenticellate after the first season, earlier puberulent: foliage subcoriaceous, thinly soft-pubescent above, densely so beneath; terminal leaflet 2 inches long, usually broadly rhombic, tapering cuneately from the middle, above this 4 or 6 crenate-lobed on each margin, the leaflet occasionally more cuneiform as a whole, being entire to far above the middle and with fewer lobes: spikes large, glomerate towards the ends of the branches, usually 3 or 4 on each of several short pedunculiform twigs, bracts tomentulose on the back as well as marginally: fruit large, very hirsute.

Dry hills, Riley Co., Kansas, J. B. Norton, 1895, flowers 25 April, fruit 12 Oct. Both as in U. S. Herb.

S. glabrata. Branches elongated, straight, puberulent the first and second seasons: foliage canescent when very young, in maturity glabrate, with some traces of pubescence on the veins above, some minute hairs all over the lower face, the veins there hirtellous; terminal leaflet 1¾ to 2¼ inches long, with rather short cuneate base and much longer somewhat deltoid-ovate main blade, this deeply 3-lobed, the terminal lobe broadly and crenately 3 to 5-lobed; lateral leaflets 1 inch long, with about 4 shallow rounded lobes: spikes short, 3 or 4 in each of several subsessile glomerules: bracts densely tomentose.

Black Hills, near Fort Meade, S. Dakota, Dr. Forwood, 1 Sept. 1887, n. 59 as in U. S. Herb.

S. trilobata (Nutt.). Common in the whole northerly extension of the Rocky Mountains from northern Colorado to beyond the British boundary. Twigs puberulent, very delicately so, the first season, afterwards glabrous, light ash gray. Leaves small, subcoriaceous, glabrous, etc., all as described by Nuttall. Bracts of the many short spikes wholly tomentulose. Pedicels of the flowers hirtellous.

Perfect specimens of this are before me in flower, from Pole Creek, Wyoming, by A. Nelson, 2 June, 1894, and in mature leaf and young fruit from Cheyenne, 25 June, 1896, collected by myself, both sheets in my own herbarium.

S. Bakeri. Size and habit of the last, or often larger; foliage rather larger, thinner, always more or less pubescent on

both faces; terminal leaflet with more gradually and less narrowly cuneate base, often 3-lobed, but lobes entire, or those on vigorous shoots with some secondary lobes, lateral leaflets round-oval, equal sided, with lateral rounded entire lobes: bracts tomentose: pedicels glabrous.

From near Fort Collins, Colo., C. F. Baker, 1896, southward to northern New Mexico, where collected by Heller, 1897; unless I confuse two species, of which Mr. Baker's fine specimens in my herbarium are to stand for *S. Bakeri.*

S. SUBPINNATA. Shrub robust and tall, with straight suberect branches red-brown and tomentulose the first season: leaves dark green above but thinly soft-strigulose, paler and more densely pubescent beneath, with the veins hirsutulous; the leaf as a whole appearing as if 5-foliolate, the terminal leaflet, 2 inches long, being completely divided in the middle into 3 segments or divisions, the leaflet as a whole deltoid, the terminal segment rhomboid, acute, with 2 or 3 coarse teeth on either margin, the lateral segments entire on the inner margin 1 or 2-toothed on the outer; lateral leaflets broadly ovate, 1 inch long, equal-sided, both margins lightly sinuate-lobed: spikes with bracts wholly tomentose: flower and fruit not seen.

Known only as collected by the writer, in the cañon of the Arkansas at Cañon City, Colo., 7 Sept. 1896; the collecting done hastily, the remarkable quinate character of the foliage not noted at that time.

S. LEIOCARPA. Branches not slender, long and straight, obsoletely pubescent; twigs of the season tomentulose: foliage small, pale and villous-strigose above, beneath canescently villous-tomentulose; terminal leaflet 1¼ inches long, abruptly cuneate much below the middle, incisely and deeply 3 to 5-lobed, the lobes obtuse, often crenate-toothed: spikes many, small, subsessile, forming collectively a long thyrsiform cluster: fruits small, little compressed, nearly or quite glabrous.

Valley of the Rio Grande at Mesilla, New Mexico, E. O. Wooton, 1897, n. 48 as in U. S. Herb.

S. EMORYI. Shrub low, very stout, the branches for two seasons very densely clothed with a velvety yellowish tomentum;

foliage less densely velvety on both faces; terminal leaflet 3-lobed, the broad obtuse lobes coarsely crenate or dentate: bracts of the short spikes not more tomentose than in other species, even partly glabrous: fruits large, not strongly hirsute.

Hills and low mountains of eastern and southern New Mexico, thence across to northeastern Arizona; first collected on Emory's expedition. Mr. Wooton has distributed specimens as "*Rhus Emoryi* n. sp.," but I do not find any printed character, though such may possibly exist.

S. OXYACANTHOIDES. Low, intricately compact with many slender recurved branches, the older pale ash-gray and glabrous, the growing ones minutely puberulent: leaves small, sub-coriaceous, glabrous except a few hairs along the veins on both faces; terminal leaflet 1 inch long, broadly cuneate-obovate in outline, often subtruncate at summit and there deeply 3-lobed, the lobes entire and subequal, or else the middle one exceeding the other two and 3 to 5-crenate, lateral leaflets not much smaller, usually 3-lobed, sometimes entire, the whole margin in all narrowly revolute: spikes 1 or 2, small, both in the axil of the uppermost leaf.

Known only in one specimen, in my own herbarium, collected by myself on some desert hillside back of Grand Junction, Colorado, 27 Aug. 1896. The leaflets imitate the leaves of a common form of *Crataegus Oxyacantha.*

S. PULCHELLA. Branches rigid, straight, hoary for several seasons with dense minute downiness; foliage small, soft-pubescent on both faces, dark green above, light beneath; terminal leaflet seldom an inch long, abruptly cuneate from below the middle, otherwise deeply 5-lobed, the lobes rarely entire, usually with 2 to 5 secondary rounded lobes; laterals half as large, mostly with 5 obtuse lobes: spikes small, sessile near ends of branches: bracts more or less tomentulose on the back: fruit small, setulose.

Toward the Rio Limpio, western Texas, C. Wright, 1852, n. 1342 as in U. S. Herb.; also later from the same general region by Reverchon, Heller, Earle & Tracy.

S. SABULOSA. Upright, slender, the mature branches glabrate, while growing obscurely puberulent: foliage small, subcoriaceous, glabrous; terminal leaflet ¾ inch long, obovate-cuneiform, tapering and entire from far above the middle, at summit broadly and obtusely 3-lobed, the middle lobe slightly exceeding the others; lateral leaflets smaller, less cuneate, the 3 lobes more shallow: fruits not small, puncticulate and somewhat bristly.

Pebbly banks or beds of the Rio San Pedro, western Texas, Charles Wright, 1851, n. 917 as in U. S. Herb.

S. HEDERACEA. Evidently dwarf, with many short rigid divergent branches, these at first obscurely puberulent, later glabrous: leaves small, of a deep almost ivy-green above and with light-colored veins, glabrous on both faces, or with some short hairs along the veins beneath; terminal leaflet ¾ to 1 inch long, below the middle quite as broad, broadly rhomboid, with about 3 shallow crenate lobes on each margin, all very obtuse but mucronulate; laterals not half as large, obovate: spikes small, subsessile, bracts transverse-rugulose, sparsely pubescent: immature fruits hirtellous and viscid-granular.

Mica Spring, Nevada, M. E. Jones, in U. S. Herb.

S. AFFINIS. Habit of the last, with similarly deep green whitish-veiny foliage, but all the leaves simple, often cleft deeply into 3 lobes, each lobe simply or doubtly crenate, as often not lobed at all, then broadly ovate above a broad truncate base, the largest 1 inch long: fruits large, viscid-granular, otherwise nearly glabrous.

Shrub of southern Utah deserts, collected at Kanab, Springdale and Silver Reef in 1894 by M. E. Jones, and distributed as "*Rhus Canadensis simplicifolia*, Greene," but erroneously, the shrub, despite its simple foliage, being more nearly akin to *S. hederacea.*

S. SIMPLICIFOLIA. *Rhus Canadensis simplicifolia*, Greene, Bull. Torr. Club, xvi 13. The leaves in this are not of the dark ivy-green of the last; they are of round-ovate outline, a little tapering to the petiole, broadest not at base but toward the middle, and simply as well as evenly crenate all around except across the base.

In between the habitat of this and that of *S. affinis* are barriers of high mountain and low desert in untold number; and other well differentiated species of this genus will be found in that significant and varied interval.

S. CISSODES. Dwarf, with tortuous or even reclining branches glabrous and of a light ash-gray, the growing twigs almost filiform, puberulent: foliage small, ivy-green, veiny and glabrous above, paler beneath and appressed-pubescent along the veins only, the leaves all simple, often deeply trisected in imitation of the trifoliolate, even occasionally divided to the midvein; terminal segment broader than long, incisely 3-lobed, the margin angular-toothed; lateral lobes about half as large, not lobed but coarsely dentate.

Grand Cañon of the Colorado, Ariz., near Indian Garden, Bright Angel Trail, C. H. Merriam, 10 May, 1903. Elegant vine-like species, and a nice link between the usual trifoliolate type, and that with rounded and simple leaf.

S. ANISOPHYLLA. Dwarf, stout rigid short-branched desert shrub; twigs for two seasons puberulent, afterwards gray, glabrate: foliage at least half-grown at flowering time, small, distinctly trifoliolate but lateral leaflets small and degenerate, never equal to each other in size, the largest not half the size of the terminal, this obovate-cuneiform, lightly 3-lobed and obtusely so: small round capitiform spikes many; bracts transverse-rugose in the middle, only minutely and obscurely ciliolate.

Surprise Cañon, Panamint Mountains, southeastern Calif. A. K. Fisher in Death Valley Exp. n. 618 as in U. S. Herb. A still earlier link in the connection between trifoliolate and simple-leaved species.

S. ELEGANTULA. Slender and tortuous or reclining like *S. cissodes*, only the growing twigs puberulent, also the foliage half-grown at flowering time: leaflets 3 and subequal, all incisely lobed, the terminal one doubly so: spikes 1 or 2 at the end of each slender branch, capitiform, broader than long; bracts tomentulose.

Flagstaff, Arizona, May, 1893, N. C. Wilson, as in my herbarium.

S. PUNCTICULATA. Low, stout, rigid, the short branches leafy and puberulent, glabrate after the second season, leaves small, very short-petioled, subcoriaceous, deep green and glabrous above, paler beneath and appressed pubescent on the veins, both faces muriculate-punctate; terminal leaflet ¾ inch long, broadly obovate above an acute rather than cuneate base, doubly and obtusely crenate: fruit very large, scattered, one only from each spike, wholly glabrous, or with a few small bristly hairs.

Union Pass, northern Arizona, 31 May, 1903, N. C. Wilson, as in my herbarium. That this species should be in mature leaf and fruit in May, and *S. elegantula* barely in half grown leaf and full flower in the same month of the same year, and the two occupying stations perhaps 60 or may be 40 miles apart, should intimate to the untravelled the wonderful differences of climatic and other environment plants find there within a small extent of territory.

S. TRINERVATA. Branches stout, rigid, straight, puberulent lenticellate-tuberculate: foliage coriaceous, dark green above, lighter beneath, both faces obscurely puberulent, the margins and veins beneath sparsely pubescent: terminal leaflet 1 inch long, cuneate and entire from about the middle, broadly and shortly 3-lobed, the lobes very obtuse, the terminal now and then 3-crenate, the 3 veins leading to the 3 lobes chiefly conspicuous; lateral leaflets smaller, equal-sided, broadly 5-crenate: scales of the small spikes wholly villous-tomentose.

San Francisco Mountain, Ariz., 2 Sept., 1889, F. H. Knowlton.

S. HIRTELLA. Branches slender, hirtellous-tomentose when young, not quite glabrate the second season: leaves small and leaflets elongated, soft-pubescent on both faces; terminal leaflet quite cuneiform below a short 3-lobed apex, the middle lobe longer than the others and often 3-lobed, all obtuse; laterals small and variable, some cuneate-obovate and 3-lobed, others oval and quite entire: fruits small, glabrous or with a few small bristly hairs.

Grand Cañon of the Colorado, Ariz., 10 July, 1892, E. O. Wooton.

S. BOTRYOIDES. Stoutish and with rigid ascending branches after the first season glabrate and gray, when growing finely puberulent: leaves subcoriaceous, of a deep but glaucescent green above, quite glaucous beneath, hardly pubescent except marginally and on the veins beneath; terminal leaflet 1 inch long, cuneate-obovate, 3-lobed, with or without secondary lobes, all lobes and teeth ending somewhat acutely: fruits copious in a compact terminal thyrsus like a bunch of grapes, the drupe globose and as if with little pulpiness, the epicarp thinly and finely hirsute.

Fort Apache, Ariz., June, 1900, Dr. Edw. Palmer, n. 590 as in U. S. Herb.

S. GLAUCA. Branches dark red-brown, puberulent; foliage glabrous, glaucous on both faces, most so beneath; all leaflets very obtuse and obtusely lobed, the terminal 1 to 2 inches long; of round-ovate outline with short abrupt entire base not very cuneate, each margin with about 3 broad sinuate lobes, the larger emarginate: spikes 3 to 5; bracts round-obovate, longer than broad, puberulent on the back, scarcely more so on the margin: no fruit seen.

In the vicinity of Durango, Mexico, 1896, Dr. Edw. Palmer, n. 785 as in U. S. Herb.

S. SCABERULA. Twigs of the season dark brown, puberulent, later glabrous, dull blackish: foliage small, subcoriaceeus, not pubescent, the dark green upper surface granular-scaberulous, the pale lower face more obscurely so: terminal leaflet 1 to 1¼ inches long, broadly rhomboid, tapering abruptly from towards the middle, indistinctly 3-lobed, each lobe with 3 secondary lobes or rounded teeth; lateral leaflets round-obovate, evenly and obtusely lobed or crenate all around save at the subtruncate base: fruits orange-colored, granulate-roughened, glabrous or with a few short bristly hairs.

Cochuto, Sonora, Mexico, C. V. Hartman, Oct. 1890, n. 80 as in U. S. Herb.

S. MALACOPHYLLA. Branches rather stout, soft-pubescent for two seasons: leaves of a rather light green, villous-pubes-

cent on both faces; terminal leaflet 1 inch long, fully as broad in the middle above the more or less sharply cuneate base, 3-lobed, the terminal lobe with 3, each lateral with 2 broad obtuse teeth or lobes; lateral leaflets half as large, round-oval or obovate, crenate-lobed around the summit: spikes panicled at ends of branches; bracts tomentose across the base, at apex glabrous, even as to the margin: fruits smallish, globose, sparsely hirsute.

Griffith Park, Los Angeles Co., Calif., Apr. and Nov. 1902, Ernest Braunton, in U. S. Herb.

S. STRAMINEA. Growing twigs puberulent; also the foliage, but this not strongly so, glaucescent above, more so beneath: terminal leaflet 3-lobed and the lobes crenate; laterals crenate: flowers not yellow, only pale straw-color; bracts pubescent at base only, above glabrous and with margin not only naked but scarious: fruit not seen.

Along Lyttle Creek, San Gabriel Reserve, Calif., 27 Apr. 1898, J. B. Leiberg in U. S. Herb. Specimen in full grown leaf, while not yet out of flower.

S. CRUCIATA. Rigidly and divergently branching, growing twigs pubescent: leaves dark green but glaucescent above, lighter beneath yet not there glaucescent, pubescent along the veins, the upper face merely scaberulous: terminal leaflet 1 inch long and the same breadth in the middle, somewhat cruciform above the abruptly cuneate base, showing 3 broad lobes, the laterals divaricate, all more or less crenate-toothed or-lobed; lateral leaflets round-obovate, crenate: bracts of spike pubescent only at base, the naked margin subscarious: fruit waxy-granular, glabrous.

Hot Springs in the northern part of San Diego Co., Calif., 1875, Dr. Edw. Palmer.

S. QUINATA. *Rhus triobata*, var. *quinata*, Jeps. Eryth. i. 141. Large species, common in middle Californian coastal mountains and valleys.

S. ANOMALA. Growing twigs soft-pubescent with short mostly deflexed hairs: foliage large, as nearly quinate as that of *S. quinata*, more or less densely soft-pubescent on both faces;

terminal leaflet of deltoid-ovate cut, 1¼ inches long and as wide, incisely cleft into 3 segments all doubly crenate and obtuse; lateral leaflets doubly crenate: inflorescence seemingly a panicle of alternate divaricate short spikes; bracts villous-tomentulose from base to summit but not ciliate: immature fruits densely wavy-granular and sparsely soft-bristly.

This perplexing shrub—seeming to exhibit spikes arranged in a truly panicled general inflorescence as in *Rhus* or *Styphonia*—is known only from along Little Chico Creek, Butte Co., Calif., as collected by Mrs. Austin in 1883, and with it—at least from the same station—fragments of a very dissimilar species also new, but not to be characterized from the fragments at hand. I have seen *S. anomala* only in my own herbarium, where there are two full sheets.

S. OREGANA. Twigs and branches rather densely soft-pubescent for two seasons: foliage sparsely so on both faces, but the veins beneath beset with long appressed pilose or setose hairs besides the short and downy indument; terminal leaflet 1¼ inches long, usually obovate-cuneiform, rarely broader above, lightly and doubly crenate: bracts of the spike altogether tomentose on the back, scarcely ciliolate; fruits granular, sparingly setose.

Grant's Pass, Oregon, 27 May, 1884, Thomas Howell, U. S. Herb.; with a second specimen from the same place, in leaf only, of a distinct species.

S. GLOMERATA. Branches stout, straight, rigid, ash-gray, glabrous, the young growing twigs puberulent: foliage s ubcoriaceous, deep green above, glaucescent beneath, obscurely and sparsely puberulent on both faces: terminal leaflet 1¼ inches long, rhomboidal in outline, deeply and rather sinuately 5-lobed, the lobes obtuse; laterals usually 3-lobed: bracts pubescent at base, naked and rugulose on the back, the margin delicately ciliolate: fruit smallish, in compacted short glomerules forming a long thyrsus at ends of branches; epicarp granulate, very sparsely short-setose.

Pocatello, Idaho, May and July, 1893, Dr. Palmer, nn. 44 and 396 as in U. S. Herb.

S. LASIOCARPA. Branches pubescent the first season, not wholly glabrous until the third: foliage bright green above, paler beneath, prominently veiny and sparsely pubescent on both faces: terminal leaflet 1¼ to 1¾ inches long, cuneate-obovate, obtuse, coarsely crenate from below the middle, slightly 3-lobed near the summit; laterals more than half as large, less cuneate and mostly only 3-crenate at the summit: fruits large, glomerate in a large thyrsus, densely soft-hirsute.

Rocky hills of Osborne Co., Kansas, 9 June, 1894, C. L. Shear, n. 104 as in U. S. Herb.; no other known species has a fruit so very hairy.

S. QUERCIFOLIA. Evidently dwarf, the short dark brown branches tortuous and knotted, twigs of the season puberulent: foliage small, of the texture, color and indentation of leaflets of white oak; terminal leaflet ¾ to 1¼ inches long, obovate-cuneiform, 3-lobed above the middle, the rounded lobes entire, or oftener crenate, all lobes and teeth very obtuse; laterals more than half as large, simply 3 to 5-crenate, upper face of all scabrous-puncticulate, beneath obscurely pubescent, the veins elevated: fruit hirsute.

Cañons in Seward Co., southwestern Kansas, 29 Aug., 1897, A. S. Hitchcock, n. 1106 as in U. S. Herb.; also at Syracuse, Kansas, C. H. Thompson, 1893.

S. TRIDOPHYLLOIDES. Habit of the last but the dark-colored branches puberulent for two or three seasons, the growing twigs densely, and foliage sparsely, pubescent: terminal leaflet ¾ to 1¼ inches long, cuneate-obovate, acutely 5 to 7-lobed or toothed above the middle; laterals only one-third smaller and quite similar, all subcoriaceous, bright green and minutely recticulate above, lighter and venulose beneath: fruit very hirsute.

Stillwater, Oklahoma, F. A. Waugh, in U. S. Herb.; no date given.

S. COGNATA. Allied to *S. quercifolia*, but larger thinner foliage of different figure and that less uniform, some with all three leaflets cuneate-obovate and quite entire, the more usual terminal leaflet 1 to 1½ inches long, obovate-cuneiform, or more commonly cuneate-obovate, angularly and rather coarsely about

1-toothed on each side, the terminal tooth often larger and now and then tridentate; laterals half as large, cuneate-obovate, 3-toothed: fruit small, globose, scantily and shortly hirsute.

Baker, Earle & Tracy's 525 from Durango, Colo, 1898; Baker's 456 from Arboles, 1899, all as in U. S. Herb.; said to be common in that part of southwestern Colorado; and there is a fragment from Colorado Springs, by Knowlton 1896, that does not differ essentially.

S. RACEMULOSA. Dark brown branches obscurely puberulent even to the third season, growing twigs minutely but densely pubescent: foliage of a rich dark green above, whitish-veiny and minutely granular, beneath glaucescent, the veins and margins pubescent; terminal leaflet obovate-rhomboid, 1 to 1½ inches long, obtusely 3-lobed near the summit, or coarsely 2 or 3-crenate on either side and less obtuse: flowers clustered in short racemes on slender twigs and appearing in late summer after the maturity of the foliage, all on elongated and even pendulous pedicels that are hispidulous toward the base, glabrous under the flower, bracts transverse-rugulose on the back and minutely setulose.

Near Fort Huachuca, Ariz., Aug. 1394, Gen. T. E. Wilcox, n. 378 as in U. S. Herb. Apparently the same is a shrub of Chihuahua, by E. W. Nelson, from below Cacheco, 24 Aug., 1899, with immature fruit distinctly pedicellate and drooping. It is Nelson's 6234 as in U. S. Herb.

When Dr. Engelmann published *Rhus micropylla* he thought "it a true Lobadium with pinnated leaves;" and that is what any other would be likely to say who might so intently regard its amentaceous inflorescence and precocious flowering as to overlook those several marked characters by which, over and above the pinnate foliage, this differs from Lobadium, i. e. *Schmaltzia.* Habitally it is a rigid, divaricately short-branched naked looking shrub, a desert growth, of aspect in perfect keeping with that of each of a considerable list of small-leaved half-spinescent shrubs of several families and genera; but *Schmaltzia* proper, while also well represented in the deserts, is never so.

While its species there are all much reduced in size, they present a goodly array of comparatively ample foliage, on twigs and branches always lithe and flexible; and the local deviations therefrom its trifoliolate norm are not at all in the direction of the pinnate, but just the opposite; for in the very centers of aridity the Schmaltzias in several species have simple leaves; and they are also leaves of fair size, making not the least approach to the leaflets of the pinnated *Rhus microphylla*. So, then, a "true Lobadium with pinnated leaves" would be expected to display, as all others of that genus do, leaflets ample, strongly indented on the margin, and conspicuously veiny; and we have, moreover, a plain and certain foreshadowing of what such leaves would be in *S. subpinnata* of Colorado, and *S. quinata* of California, in neither of which is there a hint, even remote, of the peculiar foliage of *Rhus microphylla*, which itself is most like that of xerophyte leguminous shrubs of the deserts of all continents.

And the inflorescences in the present type are only rather superficially like those of *Schmaltzia*. They are solitary always, and sessile; one in each axil. Each flower in the spike is embraced at base by a cup formed of three bracts, while in *Schmaltzia* each is axillary to a single bract. The flowers in this type are never yellow, always white, and the petals are ciliate. The fruits, always orange or scarlet in *Schmaltzia*, are dark purple or black in the present type, which I regard as an excellent genus and name it RHOEIDIUM.

R. MICROPHYLLUM (Engelm). Leaflets 4 to 7, oval, the lowest pair distinctly smaller but still oval, only slightly inequilateral, both faces of all scantily villous-strigulose.

Widely dispersed in western Texas, doubtless also across the Rio Grande in Mexico; the type* Charles Wright's n. 1341. In middle Texas, on the border region between the arid and the humid sections, there is another species.

R. GLABELLUM. Leaflets 9, larger, elliptic-oblong, the odd one not larger than the pair next it, the lowest pair slightly obovate, obtuse, slightly yet distinctly unequal at the not rounded base, all appearing glabrous above and very smooth, a lens showing scattered stiff appressed hairs.

Of more easterly range in Texas, evidently; the only specimens seen being those distributed from Fort Concho by Reverchon, and some fragments from Gillespie Co., by Jermy.

R. VESTITUM (Engler). Distinguished from *R. microphyllum* chiefly by more densely pubescent foliage; but there may be other differences, for it inhabits a district in New Mexico more elevated and more arid than the habitat of the type; but it also occurs in eastern Texas.

R. RUGULOSUM. Leaflets only 5, or rarely 7, as often but 3, oblong, obtuse, mucronate, revolute, villous strigulose beneath, scarcely more than scaberulous above, but minutely transverse-rugulose.

Species with the best of marks, but known only by a single good sheet in U. S. Herb., from Texas by Dr. Palmer, in 1880; no other data given.

R. RETUSUM. Leaflets quite uniformly 9, broader than in the foregoing, oval to slightly obovate, usually retuse at the broad summit, always mucronulate, the lowest pair short, round-oval, very inequilateral, upper face of all deep green and as if glabrous, but with short scattered hairs from distinct muriculations, lower face with scattered longer hairs and showing pinnate veins.

Near Lake Santa Maria, Chihuahua, Mex., Sept., 1899, E. W. Nelson, n. 6422 as in U. S. Herb. Also from Santa Eulalia Plains, Wilkinson, 1885.

R. POTOSINUM. Branches short, rigid, approaching the spinescent: leaves very small: leaflets 5 to 7, oval, except the lowest, these orbicular but extremely inequilateral, all deep green and almost shining above, but with some obscure pubescence on both faces.

San Luis Potosi, Parry & Palmer, n. 126 as in U. S. Herb.

R. CINEREUM. Very small foliage dull cinereous or glaucescent; leaflets 5 to 7, hardly pubescent on either face, beneath obviously almost divaricately feather-veined, the lowest pair oval, moderately inequilateral, all the others oval or oval-oblong and larger, all inclined to be revolute.

Near Durango, Mex., 1896, Dr. Palmer, n. 91 as in U. S. Herb.

New Plants from Southwestern Mountains.

ACHILLAEA SUBALPINA. Stoutish and low, angled and striate stems 3 to 6 inches high, thinly villous-lanate: leaves few, oblong-linear, the basal short-petiolate, the cauline sessile, auricled, all bipinnate, the segments softly spinescent-tipped, the whole leaf villous-silky: corymb of few large heads; involucres campanulate, bracts triangular-ovate to oblong-ovate, none with much pubescence, all strongly carinate-nerved, the inner with thin fuscous margins: rays large, white.

Subalpine slopes of Mount Ouray, southern Colorado, 20 Aug., 190 , C. F. Baker, n. 842.

ANTENNARIA FORMOSA Near *A. parvifolia*, every way much larger; stem 18 to 22 inches high, ending in a lax corymbose panicle of large heads: stolons depressed, 1½ to 3 inches long, their full grown leaves an inch long or more, broadly rounded and acutish at summit, thence tapering cuneately to the base, hoary above, beneath white with a dense appressed indument; stem leaves longer, exceeding the internodes, linear-spatulate, acute, erect, more loosely pubescent: heads many and large; involucres greenish white, scarcely tomentose or flocculent even at base, all the bracts with oblong-obovate acute scarious tips as long as the body or longer: male plant not known.

Low meadows at Gunnison, Colo., C. F. Baker n. 580.

ANTENNARIA LATISQUAMEA. Low and with much the habit of *A. aprica* but more slender, the few large heads of the pistillate plant commonly on long pedicels, forming a loose corymb: leaves smaller, thin, spatulate-ovate, ½ inch long or more, not densely silky-tomentose even beneath, sparsely so above: heads 3 or 4, ½ inch high, broad and many-flowered; bracts not very many, all with broad and obtuse white tips, the inner only narrower, not acute: male plant not seen.

At 10,000 feet in the Black Range, New Mexico, on a shaded slope, 30 Sept., 1904, O. B. Metcalfe, n. 1433.

ERIGERON PLATYPHYLLUS. Related to *E. macranthus* and

as large, but herbage green, only sparingly hispidulous-roughened: leaves from oblanceolate in the lowest to elliptic-oblong and oval in the upper, 3 inches long, the largest 1½ inches broad, all thin, glabrous except as to the more or less obvious hispid ciliolation of the whole margin: stem rather freely branched at summit, all the branches clothed up to the heads with large sessile oval hispid-ciliolate bracts 1 to 1½ inches long: heads large, though smaller, than in *E. macranthus*; bracts of involucre equal, not at all hairy, viscid-puberulent: rays light-violet or bluish.

Santa Rita Mountain, New Mexico, 9 Oct. 1904, O. B. Metcalfe n. 1469.

Aster orthophyllus. Plants in broad patches from a connected system of slender horizontal rootstocks; stems 1 foot high, erect or decumbent, corymbose-panicled, notably leafy and the foliage remarkably straight and erect; lowest leaves narrowly oblanceolate, the cauline lance-linear and linear, all entire and all but the very lowest acutish, green and glabrous on both faces, the margins beset with short inflexed hairs: heads above middle size; involucres broadly campanulate to hemispherical; bracts imbricated, appressed, spatulate-linear and linear, the outer obtuse, inner acute, their green tips elliptical, nearly glabrous, somewhat ciliolate: rays bluish.

Low grassy lands along the river at Gunnison, Colo., 23 July, 1900, C. F. Baker, n. 570; and nn. 545, 688 and 820 may all be forms of the same species akin to *A. adscendens*.

Aster Wootonii. *A. hesperius* var. *Wootonii*, Greene, Bull. Torr. Club. xxv. 119. Mr. Baker's n. 817 from near Gunnison represents well that of Mr. Wooton's distribution from New Mexico, and I judge the form worthy of specific rank.

Aster lonchophyllus. Stout stems erect, 2 feet high, red-purple, thinly white-puberulent, sparsely leafy up to the contracted subcorymbose panicle: basal leaves not seen, those of the stem 3 or 4 inches long, narrowly lanceolate, acute, entire, sessile, the lower by a spatulate base, all of firm texture, green and glabrous on both faces, 1-nerved, the margin barely scaberulous: heads of middle size; involucres campanulate, bracts

in 2 or 3 series, not very unequal, lance-linear, acute, loosely erect, the herbaceous tips purple-edged: rays many, light rose-purple.

In large tufts on stony slopes, Crested Butte, southern Colorado, 13 August, 1901, C. F. Baker, n. 805. A peculiar species the near affinities of which it is not easy to name.

Aster griseus. Stems decumbent or ascending, ½ to 1½ feet high, branching, sparingly villous-hairy; foliage and bracts pale as if glaucous, but finely strigose-pubescent; lowest leaves oblanceolate, 2 inches long, the cauline oblong-linear to linear, all obtuse, entire, 1-nerved, ciliate or ciliolate: heads of middle size; involucres broadly campanulate or nearly hemispherical, the bracts imbricated in 3 series, erect, appressed even to the tips, the outer obovate, obtuse, the inner more elongated, acutish, all pubescent and more or less ciliate: rays many, showy, pale violet.

The type is a plant collected by myself thirty years since in the Colorado Rocky Mountains west of Denver, on Bear Creek, at Sisty's, the elevation perhaps 9,000 feet. Mr. C. F. Baker's 632 from Doyle's southern Colorado, I think the same, though the plants are larger and with herbage even more decidedly gray-green.

Brachyactis hybrida. A foot high or more, branched from the base and bushy, the root not always annual, the plant apt to propagate by stolons from the crown; stem and branches pubescent in lines; leaves spatulate-lanceolate, sessile, entire, scabrous-ciliolate, otherwise glabrous; involucres campanulate, bracts in about 2 series and equal, all elliptic-lanceolate, the inner narrower, the outer somewhat serrulate-ciliolate; rays lavender, elongated.

Common in alkaline soil about Gunnison, Colo., 27 Aug., 1901, C. F. Baker, n. 937. The plant is remarkable as a *Brachyactis* for its many long rays, as well as by its apparently perennial duration; otherwise it is at perfect agreement with other members of this well marked genus. The name *hybrida* is next to meaningless here, and I regret having assigned it, as I did, in the distribution of Mr. Baker's collection.

MACHAERANTHERA CICHORIACEA. Annual, stoutish, 2 feet high, the stems flexuous above and somewhat fastigiately racemose-panicled and, with the branches, glandular-scabrous or hispidulous; leaves pale green, glabrous, glaucous, the larger lanceolate, sessile, 2 inches long, sparsely runcinate-dentate, those of the flowering branches, small, entire, often recurved: involucres of less than middle size, turbinate, closely imbricate, the dark green viscid bracts erect: rays few, rather short: ovaries loosely silky-villous.

Bottom of cañon at Deer Run, southern Colorado, 25 Aug., 1901, C. F. Baker, n. 918.

MACHAERANTHERA SPECTABILIS. Low, bushy, the many subcorymbose stems some 10 inches high from a biennial or perennial root: lowest leaves narrowly oblanceolate, acute, tapering to a short strongly ciliate petiole, the upper sessile and with a few spinulose teeth, all obscurely pubescent: involucres ½ inch high or more, campanulate, their many and much imbricated bracts purple, the attenuate tips viscid, spreading or recurved: rays very many, deep violet, showy: achenes nearly or quite glabrous.

Clayey banks at Marshall Pass, southern Colorado, 20 Aug., 1901, C. F. Baker, n. 873.

PECTIS TAXIFOLIA. Suffrutescent, 5 or 6 inches high, the leafy flowering branches and their foliage of a vivid green and delicately scaberulous: leaves rather fleshy, about ¾ inch long, entire, pungently acute, dotted with two rows of very large glands: peduncles slender, naked; heads turbinate-campanulate, nearly ½ inch high, many-flowered; bracts very firm, lance-linear, acute, their margins scaberulous; rays 6 or 8, large and showy: achenes hispid; pappus fuscous, of many unequal scabrous bristles.

Black Range, New Mexico, 1904, O. B. Metcalfe, n. 1440.

HELIANTHELLA MAJUSCULA. Stout, erect, 2 feet high, monocephalous, sparsely rough-hirsute with short hairs: leaves in about 4 pairs, the lower and middle broadly lanceolate, 5 or 6 inches long, subsessile, acute at each end, lightly and remotely

serrate or crenate, hispid-ciliolate: head 3 inches broad including the large rays and equally long spreading outer bracts of the involucre: pappus soft and delicate, of 2 long awns and several intervening squamellae, all aristate-pointed and villous.

Black Range, New Mexico, O. B. Metcalfe. n. 1435.

BIDENS COGNATA. Allied to *B. heterosperma* but stout and low, the heads twice or thrice as large; stem and branches sparsely hirtellous. the involucral bracts more obviously and densely so: achenes all 2-awned, the short outer ones glabrous and sparsely muriculate, the long and slender inner ones with a few minute appressed-spinulose hairs.

Black Range, New Mexico, at 9,500 feet, 30 Sept. 1904, O. B. Metcalfe, n. 1436.

LACINIARIA FORMOSA. Stout, erect, 2 feet high, leafy up to the short dense subpyramidal raceme of large campanulate heads: leaves thin, hispid-ciliolate, otherwise glabrous, all except the uppermost lanceolate, acute, the upper linear-lanceolate: upper part of stem pubescent in lines, the rachis and peduncles hispidulous: outer bracts of involucre obovate, or spatulate-obovate, inner spatulate-oblong, all obtuse, green-herbaceous and punctate except as to the narrow margin, this dark purple, erose to lacerate-dentate: achenes hirtellous along the ribs; pappus subplumose.

A few plants in a meadow at Jack's Cabin, Colo., 26 July, 1901, C. F. Baker, n. 610. Differs from its analogue in northern Colorado and Wyoming by its thin glabrous foliage and more enlarged as well as more compact inflorescence.

COLEOSANTHUS AXILLARIS. Suffrutescent, bushy, 2 or 3 feet high, branches of the season whitish, scabro-puberulent, very leafy throughout: leaves thinnish, deltoid and crenate, 1½ to 2 inches long, rather broader at base, vivid green above, scaberulous on the veins, underneath scaberulous and pellucid-glandular superficially, the veins muricate-scabrous, petioles ½ to ¾ inch long: axils with short and slender leafy-bracted twigs each with 3 to 6 nodding heads, the whole cluster from half the length of the leaves in the lowest to little exceeding

them in the uppermost, involucre about 4 lines long, 7 to 9-flowered, bracts thin, whitish, 3-nerved, obtuse or abruptly acutish: slender achenes minutely strigulose, pappus delicate, merely scaberulous.

Southward slopes of hills of the Black Range, New Mexico, at about 6,000 feet, O. B. Metcalfe, n. 1446.

Coleosanthus melissaefolius. Size and woodiness of *C. axillaris* but more branching; leaves firmer but green, ovate-deltoid, all obtuse, lightly coarsely and unevenly crenate, the upper face with few and scattered scabrous points and but an obscure venation, underneath hispidulous-roughened on the prominent but irregularly disposed and loosely anastromosing veins and veinlets, the surface obscurely scaberulous and obviously and rather strongly punctate: heads numerous on all branches and branchlets, bracts of involucre 3-nerved, obtuse, some mucronulate: achenes light-colored, appressed-pubescent; pappus delicate, scaberulous.

Organ Mountains, N. Mex., at 4,900 feet, E. O. Wooton, 1 Sept., 1897.

Hymenopappus parvulus. Branches of caudex short, stout, each bearing a tuft of small long-petioled leaves 3 inches high, the petioles 2 inches, blade 1 inch, bipinnately cut into narrowly linear segments, these firm, obtuse, hoary-tomentulose: scapiform peduncles 6 or 8 inches high, ending in a contracted cymose panicle of small heads; involucres subturbinate, ¼ inch high, bracts cuneate-obovate, with obtuse scarious tips: achenes slenderly turbinate, villous; pappus of hyaline cuneate-obovate nearly truncate short scales.

Dry hills about Gunnison, Colorado, 17 July, 1901, C. F. Baker, n. 449.

Chrysopsis asprella. Slender rigid stems 1 foot high closely tufted on a hard ligneous crown, sparsely villous-hirsute: leaves thin, oblanceolate, 1 inch long exclusive of the short petiole, both faces rough with a short strigose pubescence and copious sessile pellucid glands: heads smallish, corymbose;

bracts short, rigid, the outer subulate, villous-strigulose: rays small, deep yellow: achenes short, cuneate-obovate, silky-villous: outer pappus of slender squamellae conspicuous.

Abundant in the Black Cañon of the Gunnison River, southern Colorado, 8 July, 1901, C. F. Baker, n. 379.

CHRYSOPSIS COMPACTA. Allied to the last, not as tall, the leaves much narrower, acute, more pubescent but not as rough: terminal corymb of many heads quite fastigiate: bracts of the small involucre thinner, merely villous: rays deep yellow: outer pappus conspicuous but shorter, definitely linear-squamellate.

In dense tufts on dry open ground near Jack's Cabin, Colo., 26 July, C. F. Baker, n. 608.

PEDICULARIS ANGUSTISSIMA. Akin to *P. racemosa* and with similar undivided glabrous foliage, but somewhat paniculately branched and flowers crowded: leaves narrowly linear, 2 inches long, callous-crenulate: beak of galea short and nearly straight; lower lip of corolla greatly reduced, not as large as the galea and much shorter, the lobes erose.

Mogollon Mountains, New Mexico, 17 Aug., 1903, O. B. Metcalfe, n. 534.

PEDICULARIS MOGOLLONICA. Related to *P. Parryi*, much taller and stouter, 1½ feet high, less leafy at base, more so up and down the stem, but leaves small in proportion: spike 6 inches long, bracts 3 to 5-lobed, the long terminal lobe serrate: calyx 5-toothed, tips of the teeth apt to be dilated and with a few serratures: galea falcate, with abrupt blunt beak.

Mogollon Mountains, New Mexico, 14 Aug., 1903, O. B. Metcalfe, n. 496.

EVOLVULUS OREOPHILUS. Depressed and compact, the stems many from the subligneous branched crown of a thick tap-root, all floriferous from the base, densely leafy: leaves elliptic-oblong, sessile, acute, ½ inch long, canescent with a dense appressed silky pubescence: corollas purple, nearly ½ inch broad at full expansion, the pedicels very short, in fruit recurved.

Dry hills west of Hillsboro, at 5,500 feet at base of Black Range, New Mexico, Aug. 1904, O. B. Metcalfe, n. 1228.

PHACELIA RUPESTRIS. Perennial with habit of *P. ramosissima*, but stems low, slender, very fragile, and with the leaves, velvety with a dense short pubescence, that of stem and branches spreading, of the leaves appressed: racemes 3 to 5, short and crowded: corollas small, whitish: sepals of the small fruiting calyx nearly linear, exceeding by one-third the small round-ovoid acute 4-seeded capsule.

Crevices of rocks, foothills of the Black Range, New Mexico, 25 June, 1904, O. B. Metcalfe, n. 1012.

LAPPULA LEUCANTHA. Perennial, 2 feet high, loosely racemose from near the middle: lowest leaves not seen, those of the stem oblong and linear-oblong, obtuse, narrowed to a subpetiolar base, thin, green, very rough with short mostly appressed bristly hairs from a pustulate base: racemes long, slender, widely spreading: corolla rather large, 4 lines wide, white: back of nutlet ovate, muriculate, surrounded by a short border of alternately large and small flat glochidiate prickles, all of triangular outline and at base united, forming a kind of deeply and sharply serrated border.

Shady cañon of Iron Creek, Black Range, New Mexico, 11 Oct., 1904, O. B. Metcalfe, n. 1475.

PHLOX MESOLEUCA. Perennial, slender, 5 to 10 inches high, the mostly simple stems from horizontal rootstocks not deeply seated: herbage pale, not viscid, merely glandular-puberulent or finely pubescent: leaves 2 or 3 inches long, narrowly linear, widely spreading or recurved, the internodes ½ to 2 inches long: flowers 2 or 3 only; calyx ¾ inch long, its teeth as long as the tube, subulate-linear ending in a long slender spinescent tip, the whole calyx glandular-hirtellous: corolla-tube barely equalling the calyx, the limb 1¼ inches wide, lilac with large white center; lobes entire, obtuse, round-obovate to nearly orbicular, broadly overlapping each other in expansion.

Dry foothills of the Black Range, New Mexico, at 6,600 feet, 29 June, 1904, O. B. Metcalfe, n. 1272.

The above name was suggested by the color of specimens newly dried; but now, after a year and more, they are faded to white.

POLEMONIUM GRANDE. Stout, very erect, tall, with copious large flowers in a rather strict subcorymbose panicle; plant wholly glabrous below, the stem above the middle with pubescent intervals of some width between certain angles, the branches wholly villous-pubescent, the peduncles and pedicels strongly viscid-villous, calyx less so; mature calyx ½ inch high, with subulate-lanceolate erect teeth twice as long as the campanulate tube and strongly venulose, the veins nearly parallel at first, but somewhat anastomosing: corolla open campanulate more than an inch wide, the rounded segments cuspidately acute: stamens and style strongly declined, notably shorter than the corolla.

At 9,000 feet near Pagosa Peak, southern Colo., 5 Aug., 1899, C. F. Baker, n. 544. Large plant, glabrous as to foliage, the pinnae few.

POLEMONIUM MOLLE. Stout, 2 feet high, with smaller flowers in a much more open panicle; plant viscidly villous as to all parts of the stem, and partly so as to foliage, this of many pinnae: calyx ¼ inch high, the triangular-subulate teeth little longer than the tube, not notably veiny, sparsely short-hairy and ciliolate; corolla ½ inch wide; stamens short.

Piedra, southern Colo., 12 July, 1899, C. F. Baker, n. 545.

SILENE CONCOLOR. Rather robust and tall perennial, 1½ to 2½ feet high, the thin foliage nearly glabrous, closely muriculate-punctate; upper part of stem and the inflorescence viscid-puberulent: basal leaves lanceolate, petiolate, 3 to 5 inches long, the cauline lance-linear, sessile, 4 to 6 inches long, all entire, acutish: flowers 2 to 4 from each upper node of stem, horizontally seated on slender erect pedicels; calyx ½ inch long, turbinate-campanulate, scarious between the broad ribs, the teeth deltoid-ovate, ciliate: petals large, light green.

Black Range, New Mexico, in spruce woods at 8,000 feet, 11 Oct. 1904, O. B. Metcalfe, n. 1482.

DRYMARIA DEPRESSA. Near *D. tenella*, but dwarf, low and diffuse, with shortened pedicels and compacted inflorescence; spread of branches 2 inches, height of plant less than that: stem leaves broad, oblanceolate, obtuse: sepals obtuse, not strongly ribbed.

Open glades of the Black Range, New Mexico, at 9,500 feet, O. B. Metcalfe, n. 1430.

TRIFOLIUM NEUROPHYLLUM. Perennial, the scattered stems from horizontal rootstocks, 5 to 10 inches high, erect or decumbent, canescently villous, usually with a solitary peduncled inflorescence: leaflets of lowest leaves obovate to oblong, ½ to ¾ inch long, these passing to such as are 1½ inches and linear and spinescently acute, all very prominently transverse-venulose and doubly spinulose-denticulate, both faces more or less loosely villous especially along the midvein: head at first flowering broader than high, at length 1 inch long and the flowers deflexed: calyx with 5 equal slenderly subulate teeth of twice the length of the turbinate tube, the whole villous with long appressed hairs: corolla twice the length of the calyx, deep red-purple.

Mogollon Mountains, New Mexico, 17 Aug., 1903, at 8,500 feet, n. 532. Of the group of *T. longipes.*

MALVASTRUM DIGITATUM. Evidently rather tall, the flowering branches a foot long, these and all green parts of the plant somewhat canescent with stellate hairs: leaves small, digitately or somewhat pedately divided into about 5 linear-oblong segments, these mostly entire, abruptly acutish: ends of branches loosely racemose, the flowers on very short pedicels: corolla scarlet, ½ inch wide or more: teeth of broad depressed fruiting calyx subulate-triangular; carpels densely stellate-tomentose.

Kingston, New Mexico, June, 1904, O. B. Metcalfe, n. 941.

Atasites and Thyrsanthema

In examining and naming a collection of choice plants from New Mexico that came to my work table more than a year since, I found a new member of the genus *Chaptalia*, as I would have called it, and as after mature consideration I did afterwards call it.

I knew that, as if upon the authority of the Kew Index and of Otto Kuntze, one or more American botanists had formally deposed *Chaptalia* and had put the name *Thyrsanthema* in its place. Real authority upon any such matter does not exist; but

how men like to assume the exercise of it is well exemplified in the action of the makers of the Kew Index. Mr. Bentham had years before suggested that probably *Thyrsanthema* was the same as *Chaptalia*; but he doubted. In the Index the Benthamian query is omitted, and the Neckerian genus is put down as positively the same as *Chaptalia*; this, too, as I shall venture to guess, without so much as a glance at the pages of Necker. Otto Kuntze had also tried to show that Bentham's doubts were groundless, and that *Chaptalia* must positively be reckoned a mere synonym of *Thyrsanthema.* But American botanists ought to have learned by experience before now, Mr. Kuntze's liability to err—and that by sheer superficiality of examination —in his interpretation of Necker. Shall I point out some instances of our having changed long lines of names according to his dictates, and afterwards found ourselves obliged to change them all back again?

For my part, I am sure I shall in no quarter be accused of any bias against strict priority. If *Thyrsanthema* of 1790 is the same as *Chaptalia* of 1800, with me the former stands, even though with no one else.

Let us open Necker's volume at pages 6 and 7, both occupied by his four segregates of the Linnaean *Tussilago.* Two of the segregates, *Petasites* and *Tussilago* are old genera well established long before Linnaeus. Necker simply restores them, with the names that belong to them by right of priority. His new genera are *Thyrsanthema* and *Atasites.* The later furnishes a luminous illustration of superficial slip-shod and bungling methods of "authority" in disposing of Neckerian genera. I think everybody who has ventured a say about it has said that *Atasites* and *Gerbera* are identical; and yet *Gerbera* with Linnaeus was an *Arnica* species. Necker says twice over on the same page that *Atasites* is based on some Linnaean *Tussilago,* while in one place only on the page, he intimates that *Arnica Gerbera* may be included in *Atasites.* That is very different from making it the type species of the genus. Now what *Atasites* may be, I need not know. I only see that, according to Necker's

own reiterated statement, some Linnaean *Tussilago* is its type; to which type *Arnica Gerbera*, Linn., is appended, as it were to get it out of the way.

Returning now to *Thyrsanthema,* I note first of all that a highly significant name is assigned this new genus; even a diagnostic one. It gives distinct intimation of the nature of the inflorescence. *Thyrsanthema*—thyrsoidly arranged flowers—will apply to none of those species of the Linnaean *Tussilago* the scapes of which are monocephalous; and so it is definitely indicated by the very name, that *Thyrsanthema* is not *Tussilago nutans*, Linn. It would apply well enough to all those species of the old genus *Petasites* which Linnaeus reduced to *Tussilago.* I therefore judge by the name alone, without even a glance at the Neckerian diagnosis, that we have in *Thyrsanthema* some segregate of *Petasites*, the genus one of the characters of which is a thyrsiform inflorescence. Indeed, I feel quite sure of it; and a glance at what Necker has to say of the inflorescences of each of these four proposed segregate genera makes me doubly sure. I know beforehand that this author was accustomed to reckon as of generic value such distinctions as those between acaulescent and caulescent allies; and when it came to the acaulescent species, a group with monocephalous or monanthous scapes he would treat as forming a genus distinct from one with polycephalous or polyanthous scapes. I learned this part of Necker's method long ago. And, assuming that he was ruled by it in the present case, the two genera on his page 6 form one group, and those on page 7 another. Or more taxonomically, to *Atasites* and *Tussilago* on page 7 are ascribed monocephalous scapes. Of the two on page 6, the last we know to be polycephalous, hence, even if *Thysanthema* had been given a meaningless name, we should feel confident that it had a polycephalous scape, because of our knowledge that this author did never such a thing as to intercalate a genus with thyrsiflorus scapes, between two others, each of which have monanthous scapes. This is a very essential item in the Neckerian taxonomy.

Let us now compare diligently the descriptions Necker gives of these two allied genera *Thyrsanthema* and *Petasites.* The

distinguishing mark between them is one only. In the former the bracts of the involucre are in several series and imbricated. In the latter they form but a single series, are equal and not imbricated. It is such a distinction as the most accomplished synantherologists of a hundred years past and more, have recognized as of generic value.

Now, whoever shall find among the thyrsiflorous species of Linnaean *Tussilago,* one that has imbricated involucral bracts, will have the type of *Thyrsanthema,* Neck.

I regret the necessity of here indicating how reckless the author of the Revisio Generum has been in his reading of Necker upon *Thyrsanthema.* The name, first of all, has been meaningless to him. He cannot have given it a thought. He assumes that to be scapose, a plant must have monocephalous scapes. Had he read the corresponding part of the diagnosis of *Petasites* he would have discovered this error; for Necker says of that also, proles scaposae, indicating no difference. Necker is made to say of the ray flowers that they are small (parvi), which would apply well enough to those of *Chaptalia,* but Necker says those of *Thyrsanthema* are minute. That is not parvi; and the term minuti while not applicable to the outer circle of corollas in *Chaptalia* is true to the letter in those of certain Linnaean thyrsoid *Tussilago* species. Necker says of the pappus of his genus, simplex pilosusve, which in the Revisio is put down as simplex pilosus. One means simple *or* pilose, the other simple *and* pilose. I do not comprehend the force of this part of Necker's diagnosis; but I do know that simplex pilosusve is not the same in meaning as simplex pilosus.

As regards *Chaptalia,* based as it is on *Tussilago nutans,* it may possibly be the type of Necker's *Atasites,* I think; for, as I have shown already, it cannot be *Gerbera,* which is only an appended species, not the type. It seems as if the type of Cassini's *Homogyne,* that is *Tussilago alpina,* Linn., of which the involucre is more or less imbricated, may have stood with Necker for the type of *Atasites.* It is an European type which Necker must have known well enough, while with the then new and rare *T. nutans* of the West Indies he may have been altogether unac-

quainted. But there is too much uncertainty about all this to warrant the taking up of *Atasites* for either *Chaptalia* or *Homogyne*, both of which are later; so that, for the present, *Chaptalia* is the only tenable name for the genus long recognized by that appellation.

As for *Thyrsanthema*, whoever wishes to see that which Necker so evidently had in mind for its type, may look at its fine representation in the Hortus Elthamensi's of Dillenius, plate 230. It is entitled to the name:

THYRSANTHEMA HYBRIDUM. *Tussilago hybrida*, Linn.

New Species of Chaptalia.

C. ALSOPHILA. Leaves 3½ to 5 inches long, extremely thin and flaccid, almost glabrous, a scanty arachnosed tomentum along midvein and margin, even this often obsolete; outline obovate-oblong, acutish, the terminal half only lightly sepand-crenate, the lower narrower and distinctly crenate-lobed, even somewhat sinuate-lobed, the lobes retrorse, as are also the several prominent teeth of each: scape usually one only, 8 to 12 inches high, slender, much dilated under the involucre, the dilatation an inch long or more and white tomentulose; involucre an inch long; bracts few, subulate to subulate-linear, the margins flocculent; achenes slender; pappus slenderly stipitate.

Black Range, New Mexico, at 7000 feet, on shady northward slopes, 4 Oct., 1904. O. B. Metcalfe, n. 1454.

C. CONFINIS. Leaves 2 or 3 inches long, very firm, almost subcoriaceous, glabrous above, beneath pale with a thin but persistent tomentum not at all flocculent; outline obovate-elliptic, with 2 or 3 pairs of lobes at base, but body of leaf angulate-dentate, each tooth with a single mucro and this not retrorse: scopes 2 or 3 more, rigidly erect, 6 to 10 inches high, linear-bracted, not dilated under the involucre, this ¾ inch high, its bracts rigid: achenes tapering to a short villous beak rather than stipe.

Huachuca Mountains, Arizona, at 9,000 feet, Sept. 1882, J. G. Lemmon, n. 2789 as in U. S. Herb.

A Proposed New Genus, Callisteris.

An early attempt to resolve into natural genera the confused and impossible "Gilia" of Bentham and of Asa Gray, has been for years interrupted; but I here offer one of the ideas long entertained, namely the segregation of a natural group, all biennials or perennials, and of peculiar habit, of which Pursch's *Cantua aggregata* is typical. From the *Ipomopsis* of Michaux, itself an excellent genus and monotypic, they differ not only habitally and in foliage, but widely in character of calyx and seeds. They are in technical character, far nearer true *Gilia*, differing therefrom mainly by peculiar habit, biennial or perennial root, more fleshy and pectinate-pinnate foliage, a corolla of characteristic configuration and almost always in a manner bilabiate, the segments not radiating regularly, but one-sidedly to a greater or less degree. Moreover, no *Gilia* makes any approach to these plants in the peculiarity of their thyrsoid panicled, or really thyrsoid inflorescence. I recognize following geographic species of the genus CALLISTERIS:

C. AGGREGATA. *Cantua aggregata*, Pursch, Fl. i, 147. Calyx-teeth greatly exceeding the short tube, triangular-subulate, slenderly attenuate, herbaceous except laterally near base, hardly spinescent: corolla with rather short lobes very acute.

Plains and foothills of the Rocky Mountain region eastward and northward.

C. COLLINA. Calyx-teeth not half as long as the almost cylindric tubes, very obtuse, abruptly aristate-pointed, the point straight, rigidly erect: corolla only pinkish, its oblong-lanceolate very acute lobes reflexed, and irregularly so.

Bluffs of Clear Creek on the plains not far from Denver, collected by myself, July, 1870. Type in my own herbarium.

C. LEUCANTHA. Two feet high, stout, the copious thyrsus of large white flowers a foot long; calyx subcylindric, purple, its lobes obtuse but each ending in short herbaceous recurved tip: lobes of the very long corolla rather wide, oblong, hardly acute.

At elevations of 8,000 and 9,000 feet in the Colorado moun-

tains; there often abundant, very beautiful. Type in my herbarium, collected by myself on upper Bear Creek west of Denver, 26 July, 1889.

C. ATTENUATA. White-flowered, but corolla-lobes lanceolate, slenderly acuminate; calyx-teeth also long and slender.

Parks of the interior of Colorado. See Gray, Syn. Fl. p. 145.

C. FORMOSISSIMA. Stem parted near the ground into upright racemose rather than thyrsiform branches, the flowers very large; tube of corolla truly though narrowly funnelform, the lanceolate segments slenderly accuminate, ¾ inch long, falcate-curved, crimson, dotted copiously with yellow: calyx almost wholly herbaceous, the subulate-linear teeth about equalling the tube and reflexed.

Black Range, southern New Mexico, 1904, O. B. Metcalfe, n. 1318.

C. FLAVIDA. Calyx rather open campanulate, largely scarious, the subulate-triangular herbaceous teeth equalling the tube and diverging at the same angle with it: corolla yellowish-red if not quite yellow, the funnelform tube nearly equalled by the lanceolate slenderly acuminate segments.

Southern Colorado, Baker's 532 from Arboles, as in U. S. Herb., being the type.

C. TEXANA. Stout, low, much branched, flowering almost from the base, the flowers smallish, scarlet: calyx-tube wholly herbaceous, turbinate, the rigidly erect triangular-subulate teeth rather shorter than the tube.

Guadalupe Mountains, western Texas, V. Havard, Sept., 1881. Type in U. S. Herb.

C. ARIZONICA. Calyx short, wholly herbaceous, the deltoid very acute teeth shorter than the also rather short campanulate tube and erect: corolla with short tube not longer than the segments, these ovate-lanceolate or lanceolate, merely acute.

Northern Arizona, near Flagstaff, McDougal and others.

C. BRIDGESII. *Gilia aggregata Bridgesii*, Gray. Peculiar to subalpine districts of the Californian Sierra, perhaps northward in Oregon approaching the next, though not too closely.

C. PULCHELLA. *Gilia pulchella*, Dougl. in Hook. Fl. ii. 74. Common in Oregon, Washington and Idaho.

New Species of Pentstemon.

P. CINERASCENS. Suffrutescent, decumbent and low, the woody base producing sterile leafy branches, and others floriferous, the leaves and growing parts canescently and retrorsely short-pubescent; leaves an inch long or less, oblanceolate tapering to a narrow petiole, all entire, acute: inflorescence loose; pedicels and sepals hirtellous, the latter obovate-oblong to oblong-lanceolate, strongly striate, loosely ciliate: corolla purple, ¾ inch long, narrow, strongly bilabiate: sterile filament glabrous.

Douglas Co., Nevada, June, 1902, C. F. Baker, n. 1144 as in U. S. Herb.

P. CHIONOPHILUS. Allied to *P. confertus* and with equally congested inflorescence of small dark-purple corollas, but plant low and suffrutescent, with many decumbent woody branches, the whole plant barely 6 or 8 inches high, all the parts glabrous: leaves ¾ to 1¼ inches long, mostly obovate-spatulate, the very lowest oblanceolate and petiolate, all entire, obtuse, mucronulate: sepals very short, obovate, subtruncate and cuspidate, the margins slightly scarious: corolla less than ½ inch long, with long tube subcylindric and limb very short.

Snow Valley, Ormsby Co., Nevada, C. F. Baker, 8 July, 1902, n. 1278 as in U. S. Herb.

P. LACERELLUS. Allied to *P. confertus*, stouter, more leafy, glabrous, not glaucous; lowest leaves elliptic-lanceolate, the upper lanceolate, all entire, acute, 1½ to 3 inches long: thyrsus short, crowded and flowers small; both the leafy bracts of the inflorescence and the sepals with broad scarious margins that are deeply lacerate: corollas purple, less than ½ inch long, the tube narrow-funnelform and segments not small.

At Sargents', southern Colorado, 5 July, 1901, C. F. Baker, n. 352 as in U. S. Herb.

P. LATIUSCULUS. Near the last but very stout and large, 14

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to 18 inches high, glabrous, glaucescent: lowest leaves elliptic-lanceolate, 3 or 4 inches long, short-petioled, the cauline ovate-lanceolate to subcordate-ovate, the largest 2 inches long and 1¼ inches in breadth toward the base: thyrsus large, at base leafy and the clusters on stout peduncles of an inch or more; both bracts of the inflorescence and the long sepals scarious-edged and laciniate: corolla purple, small for the plant, not more than 4 lines long, but broad for this group, the tube ventricose and segments short.

Stony ground along stream banks at Gunnison, Colo., 24 July, 1901, C. F. Baker, n. 588 as in U. S. Herb.

P. GLASTIFOLIUS. Allied to *P. confertus*, stouter, the few stems rigidly upright, with broad and short capitiform cluster of flowers at summit: leaves light-green, glabrous, thinnish, blades of the basal ones elliptical, 1 to 2 inches long, on slender petioles as long, the 3 pairs of the cauline spatulate-oblong, sessile, erect, obtuse, all entire: sepals oblong, obtuse, ciliolate, puberulent on the back, not scarious-margined: corollas ½ inch long, nearly tubular, with short limb.

Mineral King, Sierra Nevada, Calif., 3 Aug., 1891, Coville & Funston, n. 1449, as in U. S. Herb.

P. ALSINOIDES. Low suffrutescent slender ally of *P. confertus*, the loosely tufted stems only 5 or 6 inches high, decumbent or upright, all parts glabrous except the short capitiform inflorescence: leaves nearly all obovate or obovate-lanceolate, more or less distinctly short-petioled, ¾ to 1¼ inches long, obtusish, thinnish: sepals all linear-lanceolate and acuminate, with no trace of scarious margin, sparsely pubescent on the back: corollas very small, with nearly cylindric tube and comparatively ample limb.

Near Big Cottonwood Meadows, Sierra Nevada, Calif., 20 Aug., 1891, F. W. Koch, Death Valley Exp. n. 2138, as in U. S. Herb.

P DEPRESSUS. Akin to *P. confertus* but low, cespitose, with very stout woody branches 1 to 3 inches long clothed with small entire coriaceous leaves ½ inch long, elliptical, on short stout

petioles, the 2 or 3 cauline pairs subsessile: inflorescence depressed-capitiform, the rather few corollas large for the plant, tubular, with short not very irregular limb; sepals subquadrate-oblong, glandular-pubescent

At 13,000 feet in the White Mountains, Mono Co., Calif., Aug., 1888, W. H. Shockley.

P. INTERRUPTUS. Stems tufted, stout, rigid, upright above a decumbent base, a foot high, all parts of the plant glabrous: leaves thinnish, all narrowly lanceolate, entire, 1½ to 2½ inches long: flowers small for the plant, in 5 or 6 verticillasters 1 to 2 inches apart: sepals oblong-lanceolate, the scarious edges toward the summit violet and variously laciniate: corolla 4 lines long, its tube a little dilated upwards and limb short.

Soda Springs on Mt. Conness, Calif., July, 1890, W. G. Harford. Type in my herbarium.

P. WASHOENSIS. Of the *P. confertus* group, stout and tall, 12 to 16 inches high, glabrous throughout and glaucous: lowest leaves smaller, elliptical, petiolate, cauline larger, lanceolate, sessile by a broad base, about 2 inches long, mostly shorter than the internodes: inflorescence large, as much interrupted as in the last, the lower of the 4 or 5 false whorls 2 inches apart: sepals oblong-linear, with triangular more or less toothed apex, indefinitely scarious-edged: corolla purple, more than ½ inch long, with slightly ventricose subcylindric tube, the limb ample in proportion for this group, lower lip strongly bearded, sterile filament less so.

About Washoe Lake, Nevada, alt. 5000 ft., 13 June, 1902, C. F. Baker, n. 1079, as in U. S. Herb.

P. OREOCHARIS. More than a foot high, the stout stems rigidly erect above a merely short decumbent base; plant wholly glabrous, of a light green, not glaucous: basal leaves 3 or 4 inches long, oblanceolate, acutish, the cauline in about 4 pairs, lanceolate, sessile, 2 or 3 inches long, shorter than the internodes: inflorescence long and interrupted, the axillary clusters about 5 or 6 pairs and all but the uppermost on pedicels of 1½ to 1 inch long: sepals mostly quadrate-oblong, some

obovate-dilated, all subulate-pointed and with narrow often erose scarious margins: corolla purple, small for the plant, 4 lines long, ascending, not deflexed as in the allied *P. confertus*; tube broad, nearly cylindric.

Pine Ridge, Fresno Co., Calif., July, 1900, Hall Chandler, n. 301 as in U. S. Herb.

P. LASSENIANUS. Akin to *P. confertus*, almost wholly herbaceous, stout, erect, a foot high, light green and glabrous: lowest leaves oblanceolate, cauline in 4 pairs, ovate to oblong-lanceolate, 2 inches long, sessile and half-clasping by a broad base: congested clusters of flowers sessile or definitely pedunculate: sepals with long liguliform nearly linear body and an abrupt long and slender caudate acumination, the slightly scarious margins erose or lacerate: corolla whitish or yellowish, short, but the tube somewhat ventricose, not cylindric, the segments not small.

At 6,000 feet on Lassen's Peak, California, 8 July, 1897, M. E. Jones. Type in U. S. Herb. It is also in my herbarium from the same region by Mrs. Austin, and again in a purple-flowered form as collected by myself above Donner Lake, 26 July, 1895.

P. LINEOLATUS. Tufted, slender, a foot high, glaucescent, obscurely puberulent, leafy up to the open thyrsus of middle-sized flowers: leaves all entire, the lowest with oblanceolate or elliptic blade and slender petiole, the whole but an inch long, the cauline longer, oblanceolate to oblong-linear, sessile, ascending: peduncles 3-flowered and, with the calyx, sparsely villous with gland-tipped hairs: sepals elliptic-lanceolate, acuminate, finely and closely lineolate, not scarious-edged: corolla purple, ¾ inch long, narrow but ventricose, bilabiate: sterile filament densely hirtellous at tip, sparsely so to the middle.

Known only as collected by myself in the West Humboldt Mountains, Nevada, July, 1894.

P. PHLOGIFOLIUS. Tufted stems stout, rigid, upright, 1 to 1½ feet high, very leafy with large leaves exceeding the internodes, the whole plant glabrous, glaucous: basal leaves not seen,

cauline obovate to elliptical and small toward the base, the others ovate-lanceolate, entire, sessile, ascending, 2 or 3 inches long, acute: thyrsus not compact: sepals ovate, cuspidate, lineolate, very narrowly scarious-edged: corolla purple, ¾ inch long, the tube ventricose and limb definitely bilabiate: sterile filament strongly bearded.

Castle Gate, Utah, M. E. Jones, 1894, sheet 237,290 U. S. Herb.; also by the same from Mt. Ellen, 1894, sheet 237,292, both labelled *P. confertus*, though the plant is in no way specially related to that species.

P. PRATENSIS. Stems solitary from short rootstocks, very slender, 1½ feet high: plant glabrous throughout, sparingly leafy; basal leaves few, 1 to 2 inches long, of elliptic blade and slender petiole, cauline remote in 4 or 5 pairs, mostly sessile, lanceolate, 1 to 3 inches long: thyrsus short, of 3 to 5 clusters: sepals subquadrate-oblong, narrowly scarious-margined, the subtruncate summit abruptly subulate-pointed: corolla pinkish, ½ inch long, narrow-funnelform, the segments not small; lower lip densely bearded.

Moist meadows of the Humboldt River about Deeth, Nevada, 14 July, 1896, collected only by the writer. Allied to *P. confertus*, as is also the following.

P. MODESTUS. Subalpine, with subligneous branching base and slender but rigid ascending stems 8 or 10 inches high sparsely leafy, the foliage firm and subcoriaceous: basal leaves 1 inch long or more of obovate to elliptic blade and slender petiole, cauline smaller, spatulate-oblong to oblong, acute, glabrous, as are all parts of the plant: inflorescence of 2 to 5 interrupted false whorls of small blue flowers: calyx small, of obovate sepals truncate and more or less dentate across the summit, indefinitely somewhat scarious-edged: corolla hardly 4 lines long, the very slender narrow funnelform tube deflected, the limb ample in proportion, lower lip bearded, as also the sterile filament at tip.

Ruby Mountains back of Deeth, Nevada, 20 July, 1896, collected only by myself; the type in my herbarium.

P. MILITARIS. Tufted stems stoutish, upright, a foot high, leafy with large elliptic-lanceolate sessile leaves, glabrous, except as to the short capitiform thrysus, not glaucous: leaves 3 inches long, equalling the internodes, entire, acute: sepals lanceolate, acuminate, narrowly scarious-edged, sparsely pubescent with curled hairs: corolla 8 lines long, with ventricose tube and bilabiate limb, the whole sparsely hairy without, the lip but lightly bearded: sterile filament bearded strongly at the very tip only.

Soldier Mountains, Idaho, L. F. Henderson, n. 3395, as in U. S. Herb., labelled *P. confertus*, and a true ally of that species.

P. PROPINQUUS, Of the group of *P. confertus* and allied to *P. militaris* but of widely dissimilar habit, showing copious basal and scanty cauline foliage, the stems only 8 inches high and from a subligneous branching crown or rootstock: basal leaves 2 inches long, of obovate-elliptic blade and short petiole, the few cauline reduced, oblanceolate, all acute, glabrous, thin: thyrsus either capitiform or with a smaller cluster of flowers an inch below it: calyx elongated, the sepals subquadrate-oblong or even spatulate-oblong, abruptly acuminate, their scarious margins as wide as the herbaceous middle portion, the whole calyx sparsely pubescent: corolla ½ inch long, dark-purple, slightly ventricose, the lower lip strongly bearded, also the sterile filament at tip.

Blue Mountains, Oregon, at 8,250 feet, F. V. Coville, 13 July, 1896, n. 549, as in U. S. Herb.

P. PRODUCTUS. Tufted stems a foot high or more, herbage deep green, glabrous flowers of *P. confertus* group: basal leaves elliptic-lanceolate, slender-petioled; cauline narrowly to broadly lanceolate, sessile: inflorescence mostly crowded and subcapitate but flowers not small: body of sepals lanceolate or linear, scarious edged, but ending in an equally long wholly herbaceous slenderly attenuate point, its very apex recurved: corolla purple, with uncommonly long and slender tube slightly widening upwards, hardly at all ventricose, ½ inch long; segments a little elongated: sterile filament bearded for half its length or more.

Stein's Mountain, Oregon, 1896, J. B. Leiberg, n. 2,384, as in U. S. Herb.

P. ELLIPTICUS. Herbaceous to the base, a foot high or more, rather stout, glabrous throughout, glaucescent: basal leaves ample, slender petioled, the elliptic-blades 2½ or 3 inches long, thin, faintly 3-nerved, the cauline all reduced, lanceolate, sessile by a broad base, much shorter than the internodes, those next the inflorescence denticulate: thyrsus large for the *P. confertus* group, the false whorls 5 or 6, but mostly approximate: sepals long, lanceolate, acuminate, broadly scarious and often toothed or serrated: corollas purple, ½ inch long, rather broad as to both tube and limb, scarcely ventricose, lower lip bearded, as also the sterile filament at tip and below it.

Type in U. S. Herb. from some unrecorded station in the State of Washington, in 1889, by G. R. Vasey, n. 446.

P. VERONICÆFOLIUS. Herbaceous throughout, or old plants with short suffrutescent base, stout, a foot high, glabrous except as to inflorescence, glaucescent: basal leaves small, elliptic-lanceolate, petiolate, entire, cauline larger, in about 5 pairs, oblong to lanceolate, sessile, 2 or 3 inches long, entire, or more or less distinctly denticulate: thyrsus much interrupted, all parts glandular-pubescent: sepals lanceolate, acuminate, scarious-edged: corolla ¾ inch long, with narrow-funnelform tube and bilabiate, only sparsely hairy limb.

Known to me only as collected by Sandberg, in Idaho, in 1892, the type from Lake Waha, n. 245, and larger plant with leaves all entire, from Viola, Latah Co., n. 479. The leaves in all respects, save as to the bloom on them, recall those of some large *Veronica*.

P. ALBERTINUS. Near *P. humilis*, about as large, more slender, the foliage thinner: basal leaves 2 inches long, of ovate-elliptic acute blade and slender petiole of equal length, cauline in about 3 pairs, oblong to ovate-lanceolate, 1 to 1½ inches long, shorter than the internodes, often like the basal quite entire, some denticulate, all parts glabrous: thyrsus rather lax: sepals lanceolate, acute: corolla blue, ¾ inch long, tube ventricose, limb ample, loosely bearded, as also the sterile filament at tip.

Sheep Mountain, Alberta, July, 1895, Mr. John Macoun, Geol. Surv. n. 11865, as in my herbarium.

Madronella.

During two years past the above name, now for the first printed, has existed in my herbarium on genus cover and species sheets that were formerly labelled *Monardella*. This last name has something of a history. Though in form it is generic, the author of Michaux's Flora who constructed it and first caused it to be printed, used it as specific under the genus *Pycnanthemum* to designate a dubious member of the genus; one which he seems to have thought of as perhaps meriting the rank of a genus. This is the natural and reasonable explanation of his having given the species a name that is as to form, generic. Only about thirty years later Mr. Bentham in monographing the whole family of the Labiates carried into effect what one must believe to have been purposely at least hinted at by Michaux, for he published, as a genus, the suggested *Monardella*, making Michaux's *P. Monardella* the type, renaming it *Monardella Caroliniana*, while the greater part of the species making up the genus as Bentham had it, were from Pacific North America, and not truly congeneric with the Carolinian type. And while later authors have remanded the type of *Monardella* to an older genus, and an older species even, the name has been retained for what is now a large genus of western plants.

The viciousness of this method in nomenclature I long ago endeavored to point out; and I here, after long delay, propose a new name for the western genus; a name made out of the old *Monardella*, that is MADRONELLA. I shall not attempt to transfer more than a portion of the species; but here is a considerable number of them, placing first in order what should be the type of the genus.

M. ODORATISIMA. Benth. Lab.	under	*Monardella.*
M. UNDULATA. Benth. l. c.	"	"
M. DOUGLASII. Benth. l. c.	"	"
M. CANDICANS. Benth. Pl. Hartw.	"	"
M. VILLOSA. Benth. Bot. Sulph.	"	"
M. BREWERI. Gray, Am. Acad. vii	"	"

M. hypoleuca. Gray, Syn. Fl.	under	*Monardella.*
M. lanceolata. Gray, Am. Acad xi.	"	"
M. leucocephala. Gray, l. c. vii	"	"
M. linoides. Gray, l. c. xi	"	"
M. macrantha. Gray, l. c.	"	"
M. nana. Gray, l. c.	"	"
M. Palmeri. Gray, l. c. xii	"	"
M. Pringlei. Gray, l. c. xix	"	"
M. Sheltonii. Torr. Pl. Dur.	"	"
M. thymifolia. Greene, Bull. Cal. Acad. i.	"	"
M. discolor. Greene, Pitt. ii.	"	"
M. modocensis. Greene, Pitt. iv.	"	"
M, glauca. Greene, l. c.	"	"
M. nervosa. Greene, l. c.	"	"
M. ledifolia. Greene, Pitt. v.	"	"
M. subserrata Greene, l. c.	"	"
M. globosa. Greene, l. c.	"	"
M. neglecta. Greene, l. c.	"	"
M. ovata. Greene, l. c.	"	"
M. ingrata. Greene, l. c.	"	"
M. oblonga. Greene, l. c.	"	"
M. rubella. Greene, l. c.	"	"
M. muriculata. Greene, l. c.	"	"
M. epilobioides. Greene, l. c.	"	"
M. viminea. Greene, l. c.	"	"
M anemonoides, Greene, l. c.	"	"
M. exilis. Greene, l c	"	"
M. sanguinea. Greene, l. c.	"	"
M. peninsularis. Greene, l. c.	"	"

New Species of Isocoma.

I. tenuisecta. Shrub more than a foot high, with slender scaberulous somewhat fastigiate branches: leaves from narrowly linear and perfectly entire to remotely and narrowly-

linear-pinnatisect, but most commonly consisting of a linear rachis with 2 or 3 mere teeth or short lobes on either side, all hirtellous-roughened: bracts of the involucre pale straw-color with greenish tips, these often bearing a gland: achenes short, densely silky; pappus copious.

Mesas about Tucson, Arizona, collected by Smart, 1867, by Pringle, 1884, and by Toumey, Neally and others at more recent dates.

I. Rusbyi. Branches a foot high, slender, glabrous, corymbose at summit: leaves 1½ to 2 inches long, ascending, narrowly linear, entire, obtusish, glabrous, 1-nerved: involucres broad, subcampanulate, the bracts in few series, oblong-lanceolate, acutish, glabrous, not glutinous, but acutish, tips green and pulverulent: achenes not seen.

Holbrook, northern Arizona, 20 Aug., 1883, H. H. Rusby.

I. pedicellata. Shrub 8 to 12 inches high with many very slender upright branches glabrous, viscidulous, at summit fastigiate-corymbose: leaves very small, linear-oblanceolate, glabrous, viscid, nerveless, bullate-rugulose: involucres one or several at the end of each filiform and elongated branch of the inflorescence, small, turbinate, their bracts in many series, oblong, obtuse, green and glandiferous at tip: achenes not seen.

Southwestern Texas, Edw. Palmer, 1879 or 1880, special locality not noted on label, the species most distinct from all others.

I. bracteosa. Stout, apparently only suffrutescent, but 2 feet high, with many loosely fastigiate long branches all very sparsely hispidulous: leaves small for the plant, oblong-oblanceolate, entire or with a few spinulose-serrate teeth, those of the flowering branches numerous but reduced to small sessile oblong entire acute bracts: cymes mostly of few and pedicellate heads; involucres turbinate, bracts much imbricated, subquadrate oblong, ending in an abrupt green tip thickened by a large gland, and with a terminal spinescent cusp or mucro.

Species strongly marked, but known only as collected in early flower somewhere in Tulare Co., California, by C. S. Sheldon, 1899.

I. LEUCANTHEMIFOLIA. Branches stout, tortuous, leafy with large foliage up to the ample compound cyme of large heads, scaberulous and viscid: leaves 2 inches long, broadly oblanceolate, obtuse, coarsely and closely serrate-toothed, scaberulous above, somewhat villous-arachnoid and viscid beneath: heads glomerate in twos and threes at the ends of the branches and branchlets of the cyme, large, with broadly subturbinate involucres many-bracted, the bracts with broad obtuse green and glandiferous tips: achenes not seen.

At Warren, in the Mountains of San Diego Co., Calif., 21 Oct., 1889, C. R. Orcutt.

I. EREMOPHILA. Branches 1½ feet high, stout, glabrous, parted in the middle to form a loosely fastigiate panicle of cymose corymbs: lower leaves spatulate-oblanceolate, 2 inches long, obtuse, remotely subserrate-toothed, glabrous, punctate, those of the panicle all reduced, linear, entire: involucres not small, turbinate, their bracts glabrous, not viscid, subquadrate-oblong, obtuse, only inconspicuously and shortly green-tipped, the tips of the inner with a large low gland on the back.

Southwestern part of the Colorado Desert, Calif., 1 Nov., 1890, C. R. Orcutt, n. 2,223 as in U. S. Herb.

I. OXYPHYLLA. Plant evidently large, the long branches striate, loosely villous-hairy, leafy up to the ample compound cyme of rather large heads: leaves 1 to 1½ inches long, linear-lanceolate, entire, very acute, of thin texture, glabrous, light green: involucres broadly turbinate, glabrous, not viscid, the green herbaceous tips of the bracts large, elliptical: limb of corolla remarkably short.

Jamul Valley, back of San Diego, Calif., Edw. Palmer, 1875, the species very strongly marked, and not otherwise known.

I. MICRODONTA. Branches stout, scabrous, densely leafy up to the ample cymose panicle of rather large heads: leaves small; about ¾ inch long, spatulate-oblong, entire below the middle, subserrate-denticulate near the apex, the whole margin more or less scabrous-ciliate, both faces glabrous; branches of the panicle long and leafy, the leaves little reduced: involucres turbi-

nate, their many bracts with long scaberulous green tips and abruptly as well as almost pungently acute.

Santa Maria, southern Calif., Nov., 1893, Mrs. Blochman; the plant barely in early flower at that date.

I. LATIFOLIA. Very stout stems densely leafy and villous-arachnoid, the cobwebby wool extending to the bases of the broad sessile leaves, these spatulate-obovate, ½ to ¾ inch long, ½ inch wide below the summit, coarsely and closely serrate-toothed all around except at base: heads many, rather large, forming a dense cymose panicle or thyrsus; involucres short-turbinate, of not very many bracts, these short, mostly obtuse.

Island of Santa Cruz, coast of California, by the writer, Aug., 1886, also a form of the same with foliage longer and not as broad, from Santa Rosa Island, Brandegee, 1888.

I. SEDOIDES. *Bigelovia veneta* var. *sedoides*, Greene, Bull. Calif. Acad. ii. 400.

I. VILLOSA. Stems extremely robust but decumbent, parted above the middle into a broad panicle of many and compact cymose corymbs, the stem and all branches very leafy and softly villous with long spreading somewhat viscid and arachnoid pubescence: leaves of main stem 1 inch long or more, spatulate-oblong, obtuse, coarsely serrate, sparsely villous, viscidulous, those of the branches not half as large, often subentire: heads not of the largest, very many and crowded; involucre turbinate, bracts much imbricated, pungently acute, the green tips conspicuous but bearing no gland.

Type specimens in my own herbarium, gathered from the University Botanic Garden at Berkeley, Calif., in 1893, by Mr. Davy. The plant was sent from southern California, but I cannot recall by whom. Its next of kin is *I. latifolia.*

I. DECUMBENS. Branches a foot long, very slender, decumbent, sparsely leafy and leaves very small, narrowly oblanceolate, sharply serrate-toothed: heads much scattered, about 3 at the end of each slender branchlet and all pedicellate; involucre small, turbinate, bracts imbricated, oval or oblong, acute, their green tips villous-pubescent: achenes narrow-turbinate, very silky; pappus of coarse rigid unequal bristles.

C. F. Baker's n. 3405, collected by Mr. Brandegee San Diego, went out into distribution under the above name. I now think the plant must be a hybrid between an *Isocoma* and a *Corethrogyne.* In habit it is like the latter, also as to the pappus in all but its color, while the corollas are those of *Isocoma.*

New Asteraceous Genera.

In the journal entitled ERYTHEA, established by me at the University of California thirteen years ago, I began but did not finish the work of breaking up into natural genera the *Aplopappus* of Bentham as maintained by Gray for North American species. There were then under consideration two specific types which I could relegate to none of the genera that had been so well founded by pre-Benthamian synantherologists. These I wish here to offer as representing good genera not hitherto recognized; and first,

TUMIONELLA MONACTIS. *Aplopappus monactis*, Gray, the nearest affinity of which I conceive to be *Acamptopappus*, of which it has in a way the involucres, corollas, achenes and the pappus, at least as to its permanent whiteness, while in habit and inflorescence it may be considered nearer several other groups of asteraceous shrubs inhabiting western deserts. The plant is very common upon a somewhat limited area of the Southwest, and good specimens abound in the herbaria; something that cannot be said of the following.

HESPERODORIA SCOPULORUM. *Bigelovia Menziesii*, var. *scopulorum*, Jones, Proc. Calif. Acad. 2 Ser. v. 692, where it is described by Mr. Jones, who however failed to apprehend its real affinities. It is next of kin to my genus *Petradoria*, i. e. Nuttall's *Solidago pumila*, of which it has the foliage and something of the habit, but with very different inflorescence, involucre, corolla and achenes.

Along with this I place tentatively a type which remained in *Aplopappus* as I left it, that is

Hesperodoria Hallii. *Aplopappus Hallii*, Gray. That this has rays while the type is rayless does not with me count for much ; but the involucres are not quite the same, neither is the pappus, nor even the style-tips.

Segregates from Sieversia

Never well content with North American *Sieversia* as set forth by myself seven years ago (Pitt. iv 78), I here present another and to my mind a more statisfasctory view of that heterogeneous assemblage. *Sieversia* was founded on a Siberian undershrub low and slender, with almost rotate calyx and corolla, the former nearly chorisepalous, and its mature styles are long, filiform, plumose to the very apex. We have nothing in North America that I can regard as congeneric with it ; and our most familiar kindred types are far enough from that in habit and respective generic characters, and as far from each other.

Our subarctic and subalpine, or even alpine herbs with yellow flowers, of peculiar habit and turbinate calyx-tube are distinct by two important characters of the style, which is neither plumose, nor even accrescent after flowering. They are hardly longer than the stamens ; and the whole group is so much like *Potentilla* that two of the four members of the genus already described were at first published as of that genus. There are few if any better genera of Potentilleæ than this ; and I name it Acomastylis.

A. Rossii.	Seringe in D.C. Prodr. ii.	under	*Geum.*
A. turbinata.	Rydb. in Torr. Bull. xxiv.	"	"
A. sericea.	Greene, Pitt. iii.	"	"
A. gracilipes.	Piper., Torr. Bull. xxvii	"	*Potentilla.*

A. depressa. Caudex very long and stout: leaves very short, rosulate-depressed, softly appressed-silky but not canescently so: scapiform peduncles only 2 or 3 inches high, 1-flowered : calyx tube very short, scarcely turbinate, the segments twice or thrice as long, the whole very villous.

Mount Stuart, Washington, Aug. 1898, A. D. E. Elmer, n. 1182, as in U. S. Herb.

The type that has been called *Geum triflorum* and *Sieversia triflora*, differs from the last named as far as possible in aspect. The accrescent and plumose character of the styles it has in common with *Sieversia*, but its flowers are so different that there is no comparison between them. They are analogous to those of *Horkelia* as contrasted with *Potentilla*, that is, the calyx is never expanded, and the petals are elongated and erect, never in the least spreading. The genus has a remarkable range, occurring from Labrador all the way across to the Pacific shores, and southward as far as Mexico. The species are to be distinguished, just as in most *Potentilla* groups, by almost no characters of flower or fruit, but by good characters of foliage. The red color of the calyx is nearly universal, and the mature styles are as red underneath the plume; and so I call the genus ERYTHROCOMA.

E. TRIFLORA. *Geum triflorum*, Pursh. Leaf-segments ascending, cuneiform, 1 to 1½ inches long, almost parallel-nerved, entire except near the apex, there deeply 3-toothed, or bifid and each lobe 3-toothed: calyx-segments triangular-subulate, very acute, much surpassed by the narrowly linear bractlets: petals spatulate-oblong, obtuse, nearly equalling the bractlets: plume of the achenes 2 or 2½ inches long.

Elevated prairies and drift hills of Illinois, Wisconsin, Minnesota, and the Dakotas.

E. CINERASCENS. Allied to the last, but low, the foliage barely half as large, subcinereously appressed-villous; leaf-segments not half as large, more broadly cuneate, more deeply 3 to 5-toothed, less ascending on their rachis: flowers quite as large as in the last, the red color of the calyx concealed by a denser pubescence: plume of achenes hardly 2 inches long.

Black Hills about Fort Meade, western S. Dakota, W. H. Forwood, 1887; good specimens in U. S. Herb.

E. AFFINIS. Also allied to *E. triflora* by broad segmentation of foliage with segments entire except at summit, of subquadrate-cuneate outline, ¾ to 1 inch long, deeply 3 to 5-toothed, not notably ascending but spreading on their rachis, nearly glabrous

save as to the notably pilose-ciliate margin, of the same deep green as both the foregoing: calyx of the largest, deep red and only moderately pubescent, the lance-linear bractlets large, surpassing the erect petals: plume of achenes 1¾ inches long.

In meadows near Banff, Alberta, Canada, June and July, 1899, W. C. McCalla, n. 2,073, as in U. S. Herb.

E. AUSTRALIS. Large, 1½ feet high when mature; leaves not large in proportion, deep green as in the foregoing, foliage more dissected, far less pubescent, minutely and viscidly so underneath a very sparse clothing of long pilose hairs; segments usually cleft to the middle, with one lobe entire and small, the other longer and 2 or 3-toothed, all teeth and lobes obtuse, callous-tipped: flowers mostly 3 only, long-peduncled: bractlets lance-linear, exceeding the calyx-segments, not rarely bifid at summit: plume 2¼ inches long

At 8,500 feet in the mountains of southern Colorado above Cimarron, C. F. Baker, n. 214 as in my herbarium.

E. BREVIFOLIA. Seldom a foot high, the two interdodes of the short stems each bounded by a whorl of unusually large pinnatisect leaves: proper foliage short and compact, the leaflets crowned, nearly divaricate, very broadly cuneate or cuneate-obovate, much dissected, the ultimate lobes acutish or obtuse, both faces of mature foliage almost glabrous under the sparse clothing of slender and not long pilose hairs, these not notably appearing as a marginal ciliation: segments of calyx oblong-lanceolate, bractlets uncommonly small and not exceeding them, the whole calyx fully equalled by the quite broad obtuse petals: plume fine and short, 1¼ inches long.

Subalpine in the mountains of middle Utah; collected by M. E. Jones (3 sheets in U. S. Herb.), and Lester F. Ward; S. Watsons' n. 318 probably the same, but taller and with less abbreviate foliage.

E. FLAVULA. Size of the last, more slender, the foliage rather small, more dissected but open, not of crowded leaflets, their pubescence scanty and none of it long-pilose: flowers 3, on pedicels both short and slender; calyx with very short low-hemispheric tube, short deltoid or deltoid-ovate segments barely purpled-veined like the petals and yellowish; bractlets small, shorter than the segments, and the whole calyx quite surpassed by the broad obtuse obovate petals: plume short, 1¼ inches long, not red.

Wind River Mountains, Wyoming, Nelson's 829 as in my herbarium the type for flowers; W. H. Forwood's, of July, 1882, as in U. S. Herb., for fruit.

E. DISSECTA. Large and with large foliage, distinguished from all the foregoing by light green herbage and more finely dissected foliage, the leaflets from broad-cuneiform to narrow rhombic in outline, all deeply, the larger somewhat pinnately cleft into oblong lobes, both faces almost glabrous except at or very near the margin, there sparsely long-pilose: flowers mostly 3, neither the linear bractlets nor triangular-lanceolate calyx-segments any more than equalling the yellow petals: mature fruit not seen.

Mountains of Central Colorado, about the sources of the Platte and the Arkansas rivers, therefore on the Atlantic slope of the continent. Superficially most resembling *E. ciliata* of the far northwestern Pacific slope, yet with fair characters. The best specimens are by Crandall and Cowen from near Como, and from Michigan Creek, n. 624 by an unknown collector, 5 Aug., 1899, both these as in U. S. Herb.

E. CILIATA. *Geum ciliatum*, Pursh. This is an aggregate which I fail to resolve into its specific elements by any certain characters. The plants all have a foliage much dissected and more or less strongly though loosely pilose, the margin more or less apparently ciliate. Nothing is more easy than to distinguish these plants as a group, from the eastern *E. triflora*; but this has a range of its own and comparatively restricted. This one

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has a geographic form abundant in northern Colorado, many parts of Wyoming and Montana; another in Idaho (whence came the original) and part of Montana, and throughout at least eastern Washington and Oregon; perhaps several rather than one. These all have long calyx-segments and long narrow bractlets; but the foliage is different in different localities, though not very definitely so.

Var. ORNATA is marked essentially by its calyx-bractlets, these being cleft into 2, 3, or 5 filiform segments. Specimens are before me from Idaho (Heller), Washington (E. P. Sheldon), and from the Yellowstone Park (Burglehaus).

E. CAMPANULATA. Low, the stems 6 to 9 inches high, usually 2-flowered: leaves short, the leaflets crowded, obovate-cuneiform 3 to 5-cleft, the lobes oblong, obtuse, upper face appressed-pilose, margin not ciliate: flowers broad and short, quite campanulate, with short deltoid-ovate segments and still shorter small bractlets hardly longer than the hemispherical tube, the whole greatly surpassed by the obovate very obtuse crimson-tinted petals: achenes not seen.

Olympic Mountains, Washington, July, 1900, A. D. E. Elmer, n. 2529 as in U. S. Herb.

E. CANESCENS. Stouter than the last, sometimes taller; leaves as short, broader, canescently soft-villous and sparsely pilose; leaflets obovate-cuneate, with 3 to 5 segments or teeth mostly broad, oval, obtuse but with small abrupt cusp-like termination: stems mostly 3-flowered: calyx-tube very short, bractlets small, commonly of but half the length of the ovate-lanceolate segments; petals obovate-spatulate: plume hardly more than an inch long.

Northern Sierra Nevada, Calif., Brewer, 1863, on a volcanic cone above Ebbett's Pass, 8,500 feet; also from like elevation above Donner Lake, Heller, 1903. Perhaps Cronkhite's n. 38 from Klamath Valley, and also Leiberg's n. 2555 from Steins' Mountain, both these in Oregon, may be referred here.

E. GRISEA. Caudex very large in proportion to the whole plant; stems at flowering only 5 to 8 inches high: foliage small, firm, hoary with a quite uniform short villous-tomentose pubes-

cence, longer and more pilose hairs altogether few and obsure: leaflets less than ½ inch long, cuneiform, mostly not cleft and equally tridentate at summit, others bifid and with 3 teeth on one lobe, 2 on the other: calyx-segments triangular-lanceolate, very acute, surpassed by the linear bractlets.

Subalpine slopes of the San Francisco Mountains, northern Arizona, J. B. Leiberg, 25 June, 1901. Type in U. S. Herb.

E. ARIZONICA. Much larger than the last, the foliage ample, of thin texture and pale, but as if glaucescent, not hoary with pubescence, the hairiness rather sparse, long and pilose though appressed: leaflets an inch long, obovate-cuneiform, commonly cleft into 3 to 5 unequal segments, each rather unequally 2 or 3-toothed: calyx-segments triangular-lanceolate, attenuate-acuminate, much surpassed by the linear long-attenuate bractlets: plume 1½ inches long, nearly colorless.

Hillsides and summits of the region about the San Francisco Mountains, Ariz., MacDougal's n. 65 from about Mormon Lake, and Rusby's from Bill Williams Mountain being typical.

E. TRIDENTATA. Tall as the last, the foliage of similarly glaucescent hue but also distinctly though not densely villous-pilose, the leaf-segments or leaflets cuneate and cleft only at the apex or not at all, many being simply tridentate at apex: flowers large, long-peduncled: calyx-segments lanceolate, attenuate-acuminate, hardly surpassed by the narrow-linear bractlets; petals spatulate-oblong, subtruncate, mucronate: plume 1½ inches long.

Willow Spring, White Mountains, Ariz., Edw. Palmer, June, 1890, n. 506.

E. ALIENA. Low, with small leaves and remarkably stout stem 6 or 8 inches high: leaflets of the small leaves when grown almost glabrous above, strongly pilose-ciliate, the lower face sparsely pilose, all short, broadly cuneate, not cleft but only 3 to 5-toothed near the summit: flowers small, the low-hemispherical calyx-tube singularly turgid, even obscurely 5-saccate; segments short, ovate-lanceolate, merely acute, the bractlets small, about equalling the segments: fruit not seen.

Sierra Madre, Chihuahua, at 7,500 feet, 6 June, 1899, Townsend & Barber, n. 15 as in U. S. Herb.

Various New Species.

PETASITES VITIFOLIA. Leaves large, broadly cordate-ovate, 6 inches broad across the deeply cordate base, 8 inches long, subincisely and deeply 5-lobed, the one terminal and two basal lobes with coarse triangular teeth or secondary lobes, the others subentire, lower face of leaf thinly and only hoarily flocculent: fruiting raceme 4 inches long, rather dense, the large heads on slender pedicels: flowers and young foliage not seen.

Emerson, Manitoba, 10 June, 1880, Mr. John Macoun; type specimens in U. S. Herb., the label without specific name; the cut of the large leaf intermediate between that of *P. palmata* and *P. sagittata* in configuration like that of the grape leaf in general.

PETASITES TRIGONOPHYLLA. Leaves not large, about 4 inches long, nearly or quite as wide in the middle, of a peculiar triangular outline and consisting of a terminal part not larger, even smaller now and then, than either of the two subhastate or subsagittate-basal lobes, all three primary subdivisions deeply and incisely cut into triangular secondary lobes and these entire or toothed, upper face of leaf deep green and whitish-veiny, the lower thinly white-tomentose: scapes stout, covered with imbricated lanceolate bracts usually ending in a small trifid blade: heads many, small, subcorymbose.

Wet meadows, Carlton Co., Minnesota, May and June, 1891, J. H. Sandberg, as in U. S. Herb.

EUTHAMIA HIRTELLA. Growing in colonies; stems a yard high from rootstocks, striate-angled, hispidly hirtellous: leaves ascending, lance-linear, 3 to 4 inches long, faintly strigulose above, beneath almost hispidulous along the veins, the margins serrulate-scabrous: branches of corymbose summit fastigiate, strongly hispid-hirtellous: heads subsessile in glomerules of 3 or more, the whole formed into a nearly flat-topped dense corymb: involucres turbinate, their bracts hardly acute, the short outer ones green-tipped.

At present known only from northern Indiana, as collected by myself at Lakeville, 29 Sept., 1903, and by Mr. C. C. Deam in Wells Co., 27 Aug., 1905. In characters approaching *E. Nutt-*

allii of the middle Atlantic slope, but taller, with longer, narrower and ascending rather than spreading foliage, a longer and more fastigiately branched corymb, etc.

POLYGONATUM VIRGINICUM. Stem stoutish, 3 feet high, notably striate: leaves elliptical, about 4 inches long and 2 in width, neither acuminate nor even acute, the short tip very obtuse, glabrous throughout, glaucous beneath, above of a dark rich green and marked conspicuously by about 17 slender parallel nerves, of which 8 nearly equal the midvein in prominence, the alternating ones less prominent: peduncles 2-flowered, rather short, ascending, the pedicels subequal: perianth tubular, 7 lines long.

Bluffs of Holston River, southeastern Virginia, May, 1892, John K. Small; type in U. S. Herb., labelled *P. commutatum*, like that species in size, but in size only, being a true ally of *P. biflorum.*

POLYGONATUM CUNEATUM. Stem rather slender, 1½ feet high, the naked lower portion finely striate: leaves narrowly cuneate-elliptic, elongated, stout, 5 inches long, 1½ in width, acuminate, tapering somewhat cuneately at base to a short petiole, glaucous beneath and sparsely and minutely pubescent with very slender yet obviously acute hairs, dark green and glabrous above, both faces pervaded by 9 to 11 nerves of which the midvein alone is very conspicuous, 2 laterals less so, the others faint: peduncles filiform in flower and pendulous, the lower 2-flowered, the upper 1-flowered: perianth small, 4 lines long, whitish as to the tube: berries small.

In forests of sugar-maple on the northern peninsula of Michigan, near Turin, Marquette Co., 31 May, 1901, Bronson Barlow; type in U. S. Herb., sheet 416,083; beautifully marked by the distinctly cuneate-based long foliage.

POLYGONATUM BOREALE. More than a foot high, nearly upright, rather slender, the leafy portion of the stem shorter than the striate naked basal part: leaves large for the plant, elongated-elliptic, 4 inches long, 1½ in width, glaucous beneath and loosely pubescent with very fine more or less curled and appressed hairs of equal thickness from end to end, above pale and glaucescent but glabrous, the manifest nerves 5 to 7, but

only 3 prominent: peduncles filiform, pendulous, mostly 1-flowered, when 2-flowered the pedicels very unequal: perianth very small, 4 lines long, of a very deep green, darker than the foliage.

Winona, Minnesota, 9 June, 1885, John M. Holzinger; type in U. S. Herb.

Mutations in Viola

Among the North American violets that have been first brought into notice through my researches during the last ten years, there are several which, at the time of their publication I indicated as being perhaps mere abrupt metamorphoses, so to speak, of more common and familiar forms; abrupt though perhaps permanent deviations from the names of other species; distinguishable and demanding to be distinguished from mere varieties by the abruptness of their divergence from their parent types, not showing those intergradations with it which subsist between varieties and their respective type species.

Over and above those recognized by me at the outset as probable mutations, there are others which I did not at first suspect of having had such origin, but which I have since learned to think of as probably belonging to that category; and I wish without further delay, to make a list of all which I now view in the light indicated, not excluding from the list a few quite old species—published as such, at least—the very names of which are at this date half-forgotten.

V. INDIVISA, Greene, Pitt. v. 124, t. 13. To the detailed account of this given at the place cited I have to record some extension of its known range. It seems to occur in very typical condition in the immediate vicinity of Chicago. U. S. Herb. sheet, n. 313,261, over a label reading " Flora of Chicago. Collected by W. S. Moffatt, M. D.," contains four specimens, of which three are *V. pedatifida* with leaf segments wider than usual, the fourth exactly *V. indivisa*. The indication of special locality is " Claybanks." Sheet 339,398, by L. M. Umbach from Naperville, very near Chicago, 18 May, 1897, is occupied by four specimens of pure *V. indivisa*, and in petaliferous flower. The corollas are larger than in those garden-grown specimens described

and figured, but the petals are so evidently notched that this must be accepted for one mark of the form; this notwithstanding that there are occasional hints of the emarginate in those of *V. pedatifida*.

V. Bernardi, Greene, Pitt. iii. 260, also partly (and especially as to probable origin) Pitt. v. 123, and partly that of Pollard in Britton, Man. 635. Stout and low, the whole plant at petaliferous flowering only 4 or 5 inches high, the hirtellous petioles no more than twice the length of the leaves, these flabelliform, often broadly and roundedly so, yet only subtruncate at base, never cordate, but the middle basal portion tapering abruptly to the petiole: petaliferous flowers borne barely above the foliage, large, deep purple as to the petals; sepals lance oval, obtuse, somewhat serrulately ciliolate. Autumnal state not taller than the vernal, glabrate, copiously fructiferous from apetalous flowers, the capsules borne quite above the foliage and large, oblong, fully ½ inch, obtuse, of more than twice the length of the small narrow long-auricled sepals. Leaves of all stages cleft to near the middle into 9 to 12 oblong straightish (not falcate) obtuse segments.

This is the first proper diagnosis that has been given of what I had in mind as *V. Bernardi*. Much of what I and others have, in the last seven or eight years, referred to it I now see must be excluded. The actual type specimen of *V Bernardi* is a petaliferous one in my herbarium collected by me at Albion, Wis., May, 1866. Doubtless the very same, specifically, is one from Plattsville, in the same part of Wisconsin, by S. M. Tracy, 1 Nov., 1887, also in U. S. Herb., this my type for the autumnal state; but there is a better sheet of precisely the same from Riley Co., Kansas, 9 Sept., 1895, by J. B. Norton.

These autumnal specimens present points of contrast with those of *V. pedatifida* which must here be indicated. A perfect type of the last is in my herbarium, collected by myself in a typical prairie locality near Sandoval, Illinois, 1898, is just a foot high, its fruiting peduncles only 5 to 6 inches, therefore borne distinctly and far below the leaves. Another sheet by me, taken at Prairie du Chien, Wis., the same year, is 10 inches high, with peduncles of only 2 to 3 inches, or of less than one-third the

height of the foliage. The capsules of these are about three-fourths of an inch long in the longest. The real *V. Bernardi* is, then, a strongly characterized mutate.

The plant I had from Rock Co., Wis., from Mr. Bernard Saunders in 1897, is intermediate between *V. Bernardi* and the parent species.

V. PERPENSA. Tall and slender, even at petaliferous flowering 8 or 9 inches high and with peduncles and petioles of equal length, all slender, glabrous or nearly so : leaves small in proportion, thinnish, broadly subcordate in outline, deeply cleft, or the small earliest only subserrate-toothed or lobed, the segments of all the later regular and even, a little falcate, the lower margin of each apt to be serrate-toothed ; largest summer foliage 3 inches wide near the base, the length a trifle less, all the veins and even now and then the leaf-surface strigulose-hirtellous, most so beneath, sepals oblong-lanceolate, acutish, very lightly and delicately ciliolate : apetalous summer flowers on short very slender prostrate and even sometimes hypogeous peduncles: petaliferous flowers often fertile, their oblong capsules middle-sized.

The type specimens as to early state are on U. S. Herb. sheet 441,069, and were collected on a moist prairie at Dunning, near Chicago, Ill., 18 May, 1902, by Dr. H. S. Pepoon. There is another from Ottawa, Ill., by C. F. Johnson, May, 1889, and a third from "Low prairies, Dupage Co.," Ill., by Dr. W. S. Moffatt; all these from the same region roundabout Chicago. But the plant was first known to me as seen and collected by myself at Dixon, Ill., from a low prairie, 18 June, 1898. I incautiously labelled the specimens *V. Bernardi*, not so much overlooking the almost or quite hypogeous nature of their summer flowers as suspecting that this might prove to be a character of that plant, the summer flowers of which were not then known. It was from a view of these specimens of mine, labelled wrongly *V. Bernardi*, that the character of the summer peduncles was taken by Mr. Pollard for his account of *V. Bernardi* in Britton's Manual.

I doubt that *V. perpensa* has any intimate relation to *V. pedatifida*; but I find it convenient to name and define it here, as having been mistaken for that evident mutation, *V. Bernardi*.

V. FALLACISSIMA. *V. Bernardi*, Mackenzie, Man. 135, not of Greene. Low at petaliferous stage, the large foliage on short petioles as in *V. Bernardi*, but herbage of a light green, the stout petioles quite villous-hirtellous, the peduncles slender and glabrous, bearing the flowers just above the foliage: sepals lanceolate, acute, ciliolate: corolla not large, apparently blue rather than purple: foliage whether young or mature more like that of *Bernardi* than of *perpensa*, always more or less flabelliform rather than subcordate in outline, cleft to the middle in the earlier, in the later nearly to the base, at this stage on elongated petioles (plant 8 or 10 inches high) the blade more than 3 inches wide and about as long, the segments broad, obtuse, often coarsely subserrate-toothed, rather densely but shortly hirtellous-ciliate and with sharp partly appressed hairs on the veins as well as now and then in the spaces between them: apetalous flowers of summer very short-peduncled and almost or quite hypogeous, never straight or upright.

In dry woods of extreme western Missouri, Jackson Co., collected by Mr. Bush and also by Mr. K. Mackenzie, and sent to me rather copiously by both, their specimens with less divided foliage being reported by me as *V. Bernardi*, the others as *V. pedatifida*, all too hastily done, on my part; for not one of the specimens can rightly be referred to either of those species, They all represent a plant somewhat analogous to *V. perpensa*. yet in character very different. That this has any immediately genetic relation to *V. pedatifida* I altogether doubt. All the material known to me is in my own herbarium.

V. DIGITATA, Pursh. Fl. i. 171; probably also *V. ranunculifolia*, Juss. in Poir. Encycl. viii. 626. Related to *V. pedata*, from which it differs by a cuneate-obovate leaf which is undivided and digitately cleft, or merely lobed, or even only toothed. Such a violet, inhabitant of the Atlantic slope of the United States southward, was known to Michaux; next by Le Conte, who communicated dried specimens to Pursh from Virginia, with also doubtless the manuscript name *V. digitata;* but later Le Conte declined to assign it a name even as a variety,

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though he mentions it in his monograph (Ann. Lyc. N. Y. ii. 147) as a frequent state of the species. It seems to have been rarely collected; but there is a good sheet of it in U. S. Herb. from Hamlet, N. C., 15 Apr., 1897, by C. S. Williamson, who found it "In dry sand, in pine barrens." There is also a fine specimen from Bluff Spring, Clay Co., Alabama, by Pollard and Maxon, July, 1900, in which the digitate foliage appears as the aestival development in a plant whose earlier leaves were normally pedate. I take this deviation to be not exactly a mutation, but rather an example of atavism. It seems to tell us that a remote ancestor of *V. pedata* had the foliage of *V. digitata.* This view has a further warrant in the young plants of *V. pedata* that spring up from root shoots (its seedlings have never been described) the foliage of which is invariably of the digitate type, only simpler, exhibiting the cuneate figure, but with only about 3 teeth or lobes at summit.

The analogue of *V. digitata* in the case of the northwestern *V. inornata*, Greene, has been both described and figured in Pittonia.

V. LAETECAERULEA, Greene, Biol. Soc. xiv. 70. Though not quite certain that this well marked violet is a mutate of *V. papilionacea*, I have hardly a doubt that it is such. Two years ago, by Mr. Steele's guidance I came to the original station for it. I found it plentiful on the one low mound-like elevation of the Potomac flats whence the specimens had come. About the borders of the elevation there was some almost typical *V. papilionacea*, which species, however, is abundant at no great distance, on lower ground, and perfectly normal. There are acres of it on the flats, and I could find no specimens elsewhere than on the elevation referred to, which indicated any approach to *V. laetecaerulea.* This not surprising; for the true thing has all the strong characters which I assigned it when I published it.

V. CONJUGENS, Greene, Pitt. iv. 3. In the original account of this I have said that the corollas are large and blue, recalling those of *V. cucullata*; also that young plants, before acquiring the multicipitous caudex and copious leafage and flowering, might pass for *V. emarginata*—excepting, of course, the pale

color of the corolla. This blueness of the corolla was one of the facts which, taken along with the massed rootstocks, leaves and flowers, convinced me that the plants could not be referred to *V. emarginata*, although the locality was one in which that species might be looked for.

A year after having published it I transferred a clump of it to my garden, and the one self sown seeding from it had corollas almost purple, so that I have since then suspected the whole thing of being a mutate, of which *V. emarginata* is the parent, notwithstanding that the characters of it are good enough for a proper species.

V. ABERRANS, Greene, Proc. Philad. Acad. for 1903, p. 683. This offspring of *V. fimbriatula* is the first violet observed by me which at the very outset impressed me as indubitably a mutate. In the midst of a colony of the true *V. fimbriatula* near Washington there grew one plant differing from all the others not only by its cordate long-petioled leaves with no hint of the dentation, but also by the fact that its caudex was multicipitous. I transferred the plant to my garden. It flourished there for three years. Seedlings from self-sown seed sprang up around it the second year, others the third year, seven or eight of them in all. Out of those one was a revert to *V. fimbriatula*, a perfect revert, without shadow of approach to its true parent, while the other six or seven were as precisely true to the parent. I noted at the time some characters of calyx and corolla, and wrote them down, but the manuscript is lost.

After all this, the violet came in to me, in the dry, from Mr. Witmer Stone, for my opinion as to what it should be, and I gave him my manuscript name for it, and my view of its origin. He afterwards expressed his own—a zoologist's—opinion of it. It is not now rare in the U. S. Herbarium, and has come in from various localities; and here, notwithstanding my own exclusive right to the name, I find several sheets have been labelled by Mr. House " *V. aberrans* (Stone) House " !

V. SECEDENS, Greene, Pitt. v. 121. At the place of publication this has been sufficiently indicated as, in my opinion, a mutate; bearing just that relation to *V. subagittata* of the West, which *V. aberrans* bears to *V. fimbriatula* of the East.

The Genus Tridophyllum.

The species of the very old genus *Potentilla*, were distributed by Tournefort among his three genera *Quinquefolium, Tormentilla* and *Pentaphylloides*. Linnaeus' retained *Tormentilla* and relegated the other twenty-five or thirty species to one genus *Potentilla*. Since then many a taxonomist has studied the Linnaean *Potentilla* with a view of resolving its incoherent elements into a number of natural and acceptable genera. Among all the segregate genera that have been proposed, not one is better entitled to the rank of a genus than Necker's *Tridophyllum*. As its name indicates, it is founded upon species of Linnaean *Potentilla* having trifoliolate leaves. But this mark of the foliage is not the one which he considered essential. He makes the generic rank of the group to rest on the very small ovaries, greatly reduced styles, and minute naked achenes. The so-called *Potentillas* that evince these characters have other marks more obvious. Their roots are annual, or now and then of biennial duration. All other plants that ever were referred to *Potentilla* are perennial, and very many suffrutescent. The whole aspect of this group is such as to enable an experienced botanist to recognize a member of it at first glance. This is not true of even such genera as *Drymocallis* and *Horkelia*, for these are not habitally distinguishable the one from the other, or either one from certain plants that are still retained in *Potentilla*.

The North American species of TRIDOPHYLLUM are perhaps more numerous than the European; but they are every one western, and in Necker's day were yet undiscovered. His type of the genus is *P. monspeliensis*, and he does not seem to have realized the fact that *P. supina* has all the essential marks of TRIDOPHYLLUM.

The genus in a small one, but is far more widely dispersed than almost any other segregate of *Potentilla*. The prompt maturing of the individual as annuals, and the small smooth seeds

easily dispersed and in myriad numbers, must have favored so wide a dissemination.

T. MONSPELIENSE.	Linn., Sp.	under	*Potentilla.*
T. NORVEGICUM.	" "	"	"
T. SUPINUM.	" "	"	"
T. NICOLLETTII.	E. P. Sheldon,	"	"
T. PARADOXUM.	Nutt. in T. & G.	"	"
T. RIVALE.	" "	"	"
T. PENTANDRUM.	Engelm. "	"	"
T. BIENNE.	Greene, Fl. Fr.	"	"
T. CRYPTOTENIAE.	Maximowicz.	"	"

New Species of Mimulus.

M. EQUINUS. Erect, simple, 2 feet high, not stoloniferous, perhaps not perennial, remotely but equably leafy from base to summit, glabrous except as to the minutely puberulent calyx: leaves thin and delicate, 2½ inches long including the slender petiole, the blades ovate or oval, acutish, saliently dentate: raceme of few or rather many flowers: calyx large, with short subequal teeth and villous-ciliate sinuses: corolla very large, nearly 2 inches long, wholly yellow.

"Horse Pasture," near the summit of Mt. Sanhedrin, middle California, A. A. Heller, n. 5924 as in U. S. Herb.

M. IMPLICATUS. Slender perennial a foot high, much branched from near the base, abundantly leafy, few-flowered; plant deep green, nowhere puberulent, everywhere minutely and sparsely hairy: leaves equably distributed, often slender-petioled, 1 inch long or more, ovate or oval, remotely and very saliently dentate, the floral slightly broader and sessile but not reduced to bracts. pedicels of the 3 to 5 flowers greatly elongated, twice the length of the leaves: mature calyx strongly bilabiate, coarsely purple-dotted: corolla 1¼ inches long, yellow.

Mill Creek Falls, at 5,500 feet in the mountains back of San Bernardino, Calif., S. B. Parish, n. 5630 as in U. S. Herb.

Probably descended from the subalpine *M. implexus* of northern California, but with no such underground growth, and good characters of its own.

M. PANICULATUS. Stems stout and somewhat fistulous, 1 to 2 feet high, glabrous, remotely leafy, small plants simply racemose at summit, the larger in a manner paniculate, each axil bearing a raceme instead of the usual peduncles; root not seen: lowest leaves 3 or 4 inches long, peduncles and blade about equal as to length, the latter oval, obtuse, doubly dentate: pedicels and calyx as well as bracts minutely villous: corolla yellow, 1¼ inches long, with short tube and broad limb.

Witch Creek, San Diego Co., Calif., May, 1894, R. D. Alderson.

M. PRIONOPHYLLUS. Stems simple, 8 or 10 inches high from a short horizontal base or rootstock, not stoloniferous, probably only annual or biennial, densely leafy at base with somewhat rhombic-ovate or deltoid-ovate obtuse leaves an inch long or more, on very short winged petioles, the cauline smaller and remote, of obovate outline and sessile, all definitely and not very finely pubescent and rather closely subserrate-dentate; floral bracts ovate, cuspidate, not more pubescent than the proper foliage, calyx rather less so: corolla ¾ inch long, wholly yellow; the few flowers all long-pedicelled.

Willow Spring, Arizona, June, 1890, Edw. Palmer, n. 527.

A Further Study of Chaptalia.

The reference is to pages 154 to 158 preceding, an enquiry into the tenability of CHAPTALIA as the name for a certain genus of American MUTISIACEÆ[1]. What led to that study were the *C. alsophila* and *confinis* of p. 158. The investigation of these two was not made without examination and comparison of a large collection of herbarium material in the National Museum

[1] I use this name purposely as that of a Natural Family; one clearly distinct from all other so-called Compositæ There is, in my view no true relation, and nothing but the merest analogy between these plants and either asters or sunflowers.

and in my own, gathered in from almost the whole extent of southern North America, and northern and middle South America.

Out of these collections I find the following to have been hitherto undescribed ; and there are more such, doubtless.

I do not find ground for distinguishing, generically, between *Chaptalia* and *Leria*.

C. Texana. Plant with rather large foliage very thin, and with the usually solitary scape, from a short and not thick rootstock : leaves commonly 4 to 6 inches long, lyrate by a few pairs of small shallow lobes, the large terminal one oblong-oval, acutish, obsoletely sinuate and not remotely retrose-dentate, the upper face green but with a few conspicuous rolls of wool lying along the midvein, beneath permanently white-tomentose but thinly so: scape 8 to 16 inches high, bractless, floccose, not thicker under the involucre, this an inch high, of floccose-tomentose linear acuminate bracts: small achenes scabrous, the slender stipe of the pappus twice as long.

Rocky sparsely wooded ground in western Texas, the type Neally's 297 as in U. S. Herb., Lindheimer's n. 446 and the n. 674 of the Mexican Boundary Survey appear to be the same; perhaps also Reverchon's n. 1546, but that is doubtful. It seems different.

C. carduacea. Smaller than the last, the foliage firmer, hardly lyrate, the whole leaf sinuate-lobed, and somewhat retrorsely so, but the upper lobes broader and more shallow, the denticulation very sparse, upper face glabrous, lower white-tomentose: scapes only 6 inches high, bractless, rigid, wiry, the rather large heads nodding even in maturity; bracts subulate and subulate-linear, hard and rigid, pungently acute, tomentose: achenes papillose-scabrous, shorter than the stipe of the pappus.

San Diego, Texas, Miss Croft, n. 35 as in U. S. Herb.

C. sonchifolia. Plant large, about 3 scapes a foot high, the numerous leaves about 4 inches long, all from the nearly obsolete crown of a cluster of long and soft whitish roots, leaves thin, only thinly arachnoid beneath, above glabrate except as to rolls of loose wool lying along the midvein, lyrate-pinnatifid, the shallow rounded lobes each with 2 or 3 small

salient mucro-like teeth : scapes with a few filiform bracts, and gradually thickened under the head, this 1 inch high, its bracts long, narrow, thinnish, tomentose : achenes not seen.

Rincon Mountains, Arizona, at 7500 feet, G. C. Neally, 1891, n. 223, as in U. S. Herb.

C. Potosina. Thin foliage, fleshy-fibrous roots and obsolete rootstock all as in the foregoing, as to texture, but plant smaller: leaves perfectly glabrous above, very lightly flocculent beneath, scarcely lyrate, but with broad blades lightly and rather evenly sinuate-lobed, the lobes with or without a tooth: scapes dilated above under the immature heads, and bracted.

San Luis Potosi, Mexico, Parry & Palmer, n. 544, as in U. S. Herb.

C. hololeuca. Small leaves and scapes from a subligneous upright rootstock fibrous-chaffy with the remains of the leaves of former seasons : leaves ¾ to 1¾ inches long, scarcely lyrate, usually with one pair of small lobes at base of the body of the blade, this oblong-oval, acute, runcinate-toothed, the whole leaf of firm texture and thickish, densely white-tomentose beneath, less densely and more loosely so above, as well as perhaps less permanently : scapes rigid, naked, 2 or 3 inches high : involucre ½ inch high ; bracts oblong-linear, white-tomentose except at the rigid purple tip.

Near Saltillo, Mexico, May, 1898, Edw. Palmer, n. 192 as in U. S. Herb.

C. Pringlei. Larger than the last, the subligneous root-stocks horizontal and only thin-chaffy : leaves numerous, firm, very densely and compactly white-tomentose beneath, the thin coat on the upper face flocculent and more or less promptly deciduous, the leaf-outline obovate-oblong, very shallowly sinuate-lobed, not lyrate, the rather many small retrorse teeth seldom manifest: scapes solitary, 8 or 10 inches high, rigid, nearly bractless, not dilated under the involucre, this of many very narrow floccose bracts : achenes with beak or stipe as long as the body.

Cañon above Domingillo, Oaxaca, Mexico, C. G. Pringle, Nov. 1894, n. 5796 as in U. S. Herb.

C. LEUCOCEPHALA. Rootstock none, the crown of the root deep-seated, the petioles of the many leaves therefore partly hypogeous and blanched : leaves 3 or 4 inches long, somewhat lyrately sinuate and narrowed below the ovate acute terminal lobe, the whole margin remotely denticulate, texture thin, upper face glabrous, lower merely pale with some traces of a thin arachnoid tomentum: scapes 3 or 4, stout, 7 to 10 inches high, flocculent, filiform-bracted; bracts of involucre lance-linear, white with a loose tomentum: achenes finely appressed-pubescent, the beak short.

Foothills of the Sierra Madre, Chihuahua, Sept. 1887, C. G. Pringle, n. 1312 as in U. S. Herb. named *C. Seemannii*, but the foliage makes no approach to that attributed to Seemann's plant.

C. LEONINA. Rootstock short, ascending, not chaffy at top: leaves not distinctly lyrate, in outline obovate-oblong, obtuse, coarsely retrorse-crenate-lobed, obscurely denticulate, 2 or 3 inches long, thin, thinly arachnoid above, beneath densely white-tomentose: heads large, on short naked scapes of only 3 inches: bracts of the involucre broad and much imbricated, tomentose except as to the purple margins and tips, the latter pungently acute: achenes crystalline-granular, tapering to a beak of their own length.

Strongly marked species from either Coahuila or Nuevo Leon, Mexico, by Edw. Palmer, in 1880, n 764 as in U. S. Herb., in aspect more like the Texan *C. carduacea* than any other.

C. PETROPHILA. Rootstock an inch long, ascending, the roots slightly fusiform, leaves upright, 5 or 6 inches long, oblong-lanceolate, cuspidately acute, obscurely denticulate, in no degree lyrate but the base of some leaves lightly sinuate, all very thin, glabrate above, beneath thinly hoary-tomentose: scape solitary, naked, a foot high or more: bracts of involucre subulate to linear-lanceolate, floccose-tomentose except at the pungent tip.

Rocky hills near Guadalaxara, Mexico, 22 July, 1902, C. G. Pringle, n. 11315, as in U. S. Herb.

C. MONTICOLA. Rather slender and tall species of subalpine woods, with no proper rootstock and fleshy-fibrous roots: leaves

small, 1½ to 2½ inches long including the narrow petiole, not in the least lyrate or otherwise lobed, broadly cuneate-oblong, acutish, saliently dentate, often coarsely so, thin, glabrous above, beneath more or less canescently thin-tomentose: scapes very slender, ½ to 1 foot high, with few erect bracts and a long narrow head, the bracts of the involucre few, lance-linear: achenes canescently somewhat villous, short-beaked.

Mountains of middle Mexico, at 9,500 and 10,000 ft., C. G. Pringle, numbers 6411 (type) and 9882 as in U. S. Herb., both labelled *C. Seemannii*, to the description of which species these specimens in no wise respond even remotely.

C. CRISPULA. Rootstock short, upright: leaves 1½ to 3 inches long, cuneate-oblong, or some tapering more spatulately, obsoletely denticulate and more or less crisped, never in any way lobed, thinnish, glabrate above, densely tomentose beneath: scape mostly solitary, naked, flocculent, as also the subulate-linear and linear bracts of the involucre: achenes small, glabrous, pappus-stipe filiform, twice the length of the achene.

At 3000 feet in the mountains of Santa Rosa, Guatemala, 1892, Heyde & Lux, n. 3433 as in U. S. Herb.

C. DIVERSIFOLIA. Rootstock short, ascending, bearing unusually copious fleshy-fibrous roots: leaves rather few, thinnish, light green and glabrous above, thinly tomentose beneath, not concealing the many feather veins, the outline various, the terminal lobe in some subcordate-deltoid and with only a nearly straight wing-like border running down below it, in others more oval and with a pair of more or less lyrate lobes above the wing-like basal margin, the margins of all terminal lobes lightly retrorse-crenate and retrorse-denticulate: scapes 1 to 3, commonly 1½ feet high, flocculent, naked: involucre more than an inch high, its bracts all very narrow, and, by involution of the margin, appearing almost filiform: achenes small and slender, delicately scaberulous, surmounted by a filiform stipe of 4 times their length.

Near Mazatenango, Guatemala, 20 Febr., 1905, William R. Maxon & Robert Hay, n. 3504 as in U. S. Herb.

C. SUBCORDATA. Large plants, without rootstock but with ½ to 1 inch of leafy stem above ground: leaves ample, 5 to 8 inches long, very thin, glabrous above, thinly hoary-tomentose and permanently so beneath, of an unusual type of the lyrate in form, a large subcordate-oval terminal part often 4 inches long and 2 in breadth occupying the upper half, below this a broadly winged petiole, all the margins lightly and remotely crenate and with a rather close denticulation everywhere: scape usually solitary, not dilated under the involucre, this not large, many-bracted and imbricate: immature achenes short-beaked.

Islands of Porto Rico and St. Croix, the type Ricksecker's n. 447 from St. Croix, as in U. S. Herb., Percy Wilson's n. 40 from Porto Rico evidently the same.

C. FALLAX. Rootstock obsolete; leaves many, 2 to 4 inches long, oblanceolate, somewhat spatulately so, acutish, entire or faintly undulate, or obscurely crenate, no denticulation obvious deep green and glabrous above, densely and permanently white-, tomentose beneath: scapes several, slender, naked, 8 or 10 inches high, abruptly dilated under the narrow involucre; bracts of this narrowly subulate and subulate-linear, many and much imbricated: achenes with a distinct slender beak.

Vicinity of Baracoa, Cuba, Jan., 1902, Pollard & Palmer, n. 86 as in U. S. Herb. The collectors referred this to the Floridian *C. tomentosa*, evidently looking to the leaves only. By its involucre and achenes it is unmistakably of the other group, namely that of *Leria*, and not a proper *Chaptalia*.

C. PRIMULACEA. Rootstock not thick, upright, somewhat tapering and root-like: leaves many, narrowly oblanceolate, mostly 3 to 6 inches long, thin, glabrous above, beneath densely white-tomentose, but the numerous feather veins somewhat glabrate and conspicuous, the outline in no degree lyrate, the whole margin lightly repand-crenate one retrorse tooth at base of each crenature, the apex cuspidate-mucronate: scape usually 1 only, 5 to 8 inches high, very slender, naked, abruptly enlarged under the small involucre; bracts of this subulate as to the outer, the inner narrowly linear, all flocculent: achenes scabrous, the slender beak nearly as long as the body.

Island of Santo Domingo, Wright, Parry & Brummel, 1871' n. 261 as in U. S. Herb. The long narrow foliage of thin texture, singularly white beneath, and the very slender scapes together give the plant a marked likeness to *Primula farinosa.*

C. EROSA. Rather slender rootstock an inch long, ascending or horizontal, the fibrous roots neither large nor fleshy: leaves 3 or 4 inches long, very thin, dark green and glabrous above, beneath pale with a thin but close persistent tomentum, lyrate lobes small, in two pairs, body of blade oval, acutish, lightly and coarsely crenate-lobed and the whole margin sharply erose-dentate: scapes several, a foot high, slender, naked; involucre an inch high. of subulate-linear thin bracts: achenes small, slender, the slender stipe of the pappus of twice their length; pappus firm and soft.

Costa Rica, June, 1892, Conduz, n. 447 as in U. S. Herb.

C. MICRODONTA. Large, with well developed ascending, rootstock: leaves 3 to 9 inches long, with broadly oblanceolate blade tapering to a winged petiole nearly as long, margin of all minutely and not at all retrorsely denticulate, upper face darker green or even purplish, glabrous in maturity but arachnoid-tomentose when young, lower face densely silvery-tomentose: scape not slender, 16 to 20 inches high, naked, flocculent: involucre large its outer bracts subulate-filiform, inner narrowly-linear: achenes minutely hispidulous on the ribs and as minutely scaberulous between them; pappus-stipe slender-filiform, 4 or 5 times the length of the achenes.

Yungas, Bolivia, 1894, Miguel Bang, n. 2095 as in U. S., Herb., named *integrifolia* on the label; but Cassini's *Leria integrifolia* is of southwestern South America, and extremely different from this.

C. MAJUSCULA. Rootstock stout, an inch long or more: leaves commonly 8 or 10 inches, lyrate by several pairs of deep and angular small basal lobes below the very large terminal one, this oval to ovate-lanceolate, subcordate, lightly but distinctly crenate-lobed, each lobe with 2 or 3 sharp retrorse teeth, texture of the whole very thin, glabrous above, hoary beneath with a

light and thin tomentum: scapes stout, a foot high, naked, flocculent: involucre large, many-flowered, almost hemispherical at flowering, bracts very narrow, numerous: achenes minutely and sparsely pubescent along the ribs, and more minutely granular-scaberulous between them; stipe of pappus filiform, very long.

Bolivian species; Rusby's n. 1677 from Mapiri and Bang's 237 from Yungas, both as in U. S. Herb.

Icianthus and Sprengeria.

Under these names I am about to propose two other genera of Cruciferae.

ICIANTHUS has for its type species what Hooker named *Streptanthus hyacinthoides*, a Texan annual which, in the Torrey and Gray Flora, was mistakenly appended to that section of *Streptanthus* to which Nuttall has assigned the generic or subgeneric name *Euclisia*; a group marked by many characters of the calyx and corolla, and to which the type now in hand can by no means rationally be referred, its calyx not being thin, or inflated, or in the least degree bilabiate. In ICIANTHUS the calyx is (1) not in the least inflated, (2) its sepals are thick and fleshy, (3) straight to their tips, (4) forming a regular calyx (5) none of the sepals connivent at apex. The petals have (6) not the broad and deeply channelled claw, nor (7) the short and somewhat rounded limb of *Euclisia*.

The species of ICIANTHUS are perhaps several, and more than are here indicated.

I. HYACINTHOIDES. *Streptanthus hyacinthoides*, Hook. Bot. Mag. t. 3516. *Euclisia hyacinthoides*, Small, Fl. 485 in part Species exclusively Texan, bearing long loose racemes of rather small nodding flowers of a dull greenish purple.

I. GLABRIFOLIUS. *Streptanthus glabrifolius*, Buckley, Proc. Philad. Acad. 1861, p. 448 must needs be distinct by its short. crowded racemes of quite large flowers said to be rose-purple.

I. ATRATUS. Stems erect, simple, 1 to 2 feet high, bearing a simple and short raceme of large dark-purple flowers at summit; herbage glabrous, glaucescent; leaves oblong to linear, sessile: sepals tipped with a somewhat abrupt long acumination: petals nearly ¾ inch long, the oblong limb much wider than the narrow claw, of very dark purple, almost blackish: pods not known.

Along the Canadian River, Indian Territory, M. A. Carleton, June, 1891; type in U. S. Herb.

There is a type inhabiting the deserts of the Great Basin and of southeastern California which has been masquerading for half a century as a *Lepidium* with yellow flowers; a circumstance which Doctor Torrey himself in publishing the species considered very extraordinary for a *Lepidium* and he therefore named it *L. flavum*, regarding this as the most salient feature of a species, which nevertheless, has other and more significant peculiarities. Not only the flowers but also the whole herbage is yellow —at least decidedly yellow-green. Its stout depressed branches are more or less definitely dichotomous, bearing in the forks and at the ends, not the racemes of any *Lepidium*, but short subumbellate clusters of flowers and pods commonly broader than high. The lower pedicels of this cluster are leafy-bracted. The pods themselves are surmounted by a stout persistent style of half their own length, while in most lepidia there is no trace of any style at all.

Here are then, five points of divergence from each and every section of *Lepidium* that can be brought into comparison with it; and the aggregate of all these marks of this annual of western deserts, gives to the type an aspect more like that of certain desert genera of capparids, such as *Oxystylis* and *Wislizenia*, than like any genus of cruciferae that can be mentioned.

Three subspecies of SPRENGERIA are well isolated geographically, and may take names as follows:

S. FLAVA. The original of *L. flavum*, Torr., restricted to the

Mohave Desert, of southern California, a region having an elevation (as to habitat of this species) of 2,000 feet more or less. Excellent specimens have been distributed by A. D. E. Elmer. In this plant all the foliage, even that of the branches, is narrow and pinnatifid.

S. WATSONIANA. Habit of the former, with short racemes resembling heads or umbels, but branches clothed with only somewhat cuneate leaves that are sometimes few-toothed about the summit, more often quite entire and very acute: pods smaller than in *S. flava*, more rounded, the style longer in proportion, more than half the length of the pod.

Deserts of Humboldt River, northern Nevada, especially about Humboldt Lake, altitudes of 4,000 and 4,500 feet; the type Watson's n. 126 as in U. S. Herb.

S. MINUSCULA. Smaller, more slender, less depressed: racemes distinctly elongated and longer than broad: pods smaller than in either of the foregoing, more rounded, their pedicels filiform and well lengthened.

Isolated small deserts among the mountains of Inyo Co., California, at altitudes of 5,000 and 6,000 feet; type certain specimens of Coville & Funston's n. 734 as in U. S. Herb. Specimens by M. E. Jones from Owen's Valley referred here.

New or Noteworthy Species.

DALEA URCEOLATA. Slender glabrous, annual, freely branching, 5 to 8 inches high: leaflets 11 to 21 oblong to cuneate-oblong, emarginate 1½ to 2½ lines long, sparsely glandular-dotted beneath: spikes oval to oblong, ½ to 1 inch long, dense: calyx rather thin and urceolate, the very short and connivent triangular-subulate teeth villous: corollas small, light-blue.

Type specimens from the Mogollon Mountains, N. Mex., 20 Aug., 1903, by Mr. Metcalfe, distributed under n. 553. The plant has been collected by others, usually mixed with *D. polygonoides*, a species of similar habit, but with different foliage of about 5 to 7 linear leaflets.

BIDENS TENUISSIMA. Very slender, widely branching, 2 to 6 feet high, glabrous throughout: leaves mostly ternate, very thin and flaccid, long-petioled; leaflets broadly lanceolate, acuminate, remotely serrate-toothed, petiolulate, the odd one of more than twice the size of the lateral pair and on a much longer petiolule: heads extremely small for the plant, campanulate, only 2 or 3 lines high and nearly as broad, rayless; outer foliaceous and spreading involucral bracts spatulate-lanceolate, far surpassing the others, inner oblong, acutish, 3-nerved: achenes from oblong-cuneiform to cuneate-linear in each head, the outer series being shorter and broader, these with a pair of short teeth rather than awns, the inner with a pair erect upwardly barbed awns, all the achenes sparsely soft-hairy.

Inhabiting moss-covered and decaying logs in swampy woods near Saratoga, Mississippi; collected by S. M. Tracy, 2 Oct., 1903, and distributed by him under n. 8,525. A gigantic ally of *B. connata*, but with almost minute heads.

ASTER COPELANDI. Stems clustered from a mass of interturied small and wiry rootstocks, slender, ascending or assurgent, 5 to 8 inches high, usually monocephalous, sometimes with 2 or 3 subcorymbose heads; herbage green and seeming glabrous, but the margins of the small lance-linear leaves from cilolate in the lower to sharply and closely scabrous-serrulate in the upper, the peduncular upper part of the stem sparsely and softly hirtellous: heads large for the plant, the involucres hemispherical, 4 or 5 lines broad, the firm bracts in few series, subulate-linear, acute, ciliolate: rays short but rather showy, violet.

At 6,000 feet on Mount Eddy, northern California, 7 Sept. 1903, by Mr. Copeland; distributed by C. F. Baker, under n. 3,867.

PENSTEMON VASEYANUS. *P. ellipticus*, Greene, Leafl. i. 167, not Coult & Fisher, Bot. Gaz. xviii: 302.

ANTENNARIA ANACLETA. *A. latisquamea*, Greene, Leafl. i. 145, not of Piper, Bull. Torr. Club, xxviii: 41.

I am under obligations to the kindness of Mr. Piper for having indicated these errors of mine in nomenclature, which I now endeavor to correct.

An Unwritten Law of Nomenclature.

In the process of genus-naming, whether in relation to animals or plants, there are possible courses of action not a few that are in various degrees open to objection as leading to the introduction of names more or less offensive and repugnant to good taste. Many names of that character had become established in earlier and later pre-Linnaean botany; so many that, with the steady advance in literary learning and mental refinement, early in the eighteenth century Linnaeus seems to have felt that the time was ripe for a reform of nomenclature in this particular. There existed then, as there has always existed, and most naturally, a deep sense of the right of priority in nomenclature; but such appears to have been the degree of dissatisfaction felt with a host of generic names then in vogue, that Linnaeus' rules published as code in the Philosophia Botanica led at once to the suppression of a long list of distasteful names despite their being under the supposed protection of the law of priority. Such expurgation of generic nomenclature as was then made could never have been effected through the mere will of one individual reformer. Botanists in general, as men of culture, must have been already more or less disgusted with the superabundance of cheaply and easily made names that were current in all the books, and upon the tongues of all teachers of our science. Let any one who will, look for himself into the indexes of genera found in the excellent volumes of Ray, Tournefort, Vaillant, Boerhaave and others of the most celebrated among the immediate precursors of the Swedish reformer. There are I think hardly fewer than a hundred names formed by the mere adding of *oides* at the end of the generic name to make a new one for some different genus. Carex, for example, was *Cyperoides*, Oxytropis was *Astragaloides*, one rosaceous *Pentaphyllum*, and next after it *Pentaphylloides*, this indistinctive undignified onomatology—ready-made, so to speak; for the most illiterate pretender to anything approaching botany could by this cheap trick make a hundred or two of

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generic names—this name-making method, I say, had already disfigured nomenclature beyond further endurance on the part of the educated.

Then there was a second easy mode of constructing generic names *ad libitum*; that of taking two distinct names of old genera and writing them together as one, to form the title of a new genus different from both. Such were *Cytisogenista*, *Lilionarcissus*, *Narcissoleucojum*, and a dozen more of that ilk, all of which held their places in all the books, until Linnaeus called for their banishment despite their indisputable priority, and they were banished. I long since came to regard this expurgation of the list of generic names—one made, I repeat, despite priority—as his greatest benefaction to botany.

But there was one possible way of abusing the name-maker's privilege which Linnaeus did not legislate against, and that for the reason that there was then upon record no instance of it; nor could he have dreamed that such an abuse would ever have an example, so utterly irrational and absurd every thoughtful mind must regard it, at least until some one supposed to be sane and competent has led the way; for there is no kind of absurdity which some one will not approve and practice if but some supposed authority has given the first example of it. I refer to the newly introduced usage of naming two or three different genera of plants in honor—dishonor, it should be said—of one and the same man, and doing it deliberately. Against this usage no legislation or admonition was ever yet directed that I know of. Law against it was never enacted or suggested, and for the simple reason that no one would be expected to violate such a principle. From the time—now twenty-five centuries past—when *Eupatorium* and *Gentiana* were dedicated to royal botanists, down through all the later centuries of genus-naming, from Conrad Gesner, Matthiolus and Caesalpinus, of the sixteenth century, to the middle of the nineteenth, I believe that every instance of a botanist's having a second genus named in his honor was accidental; the two names—sometimes three or four, and even five—were each made without knowledge of the existence of another; and when the facts became known, and the later name must needs pass into synonymy, the new and substitute name was not al-

lowed to bear, in its structure, any allusion to the man to whom the genus had been at first dedicated. An unwritten law against such a procedure was recognized; a law, one may say, of common sense, common courtesy, good taste.

The earliest instance of an apparently deliberate transgression of this unwritten law that I meet with so far, I find in Kunth's Enumeratio, Volume V, published in 1850. There may be earlier cases, though I think not. At that date there had been already two genera dedicated to De Witt Clinton under the name *Clintonia*, one in 1817, the other in 1829. I need not here repeat the bibliography, for I gave it in the second volume of Pittonia more than sixteen years since. The author of the name, as it appeared in 1829, had no knowledge of the existence of the same as applied to another genus in 1817. His—the second *Clintonia*—was therefore but an accident; but in 1850, Kunth finding the 1817 *Clintonia* valid, altered that of 1829 to *Wittia*, thus dedicating a second genus to De Witt Clinton. A few years later Dr. Torrey came to know this and promptly declined to make use of or give recognition to Kunth's *Wittia*; but, though it had priority in its favor, he suppressed it, substituting *Downingia*; and *Downingia* was at once adopted everywhere, both in America and in Europe, *Wittia* therefore hardly obtaining recognition as a synonym. This must have been Dr. Torrey's first intimation that it could ever enter into the mind of a botanist to do such violence to one of the most fundamental principles of nomenclature; and his only passing comment on Kunth's error is "It would be inadmissible to bestow two genera on the same person."[1] It is possible, barely, that Kunth did not know that Rafinesque's original *Clintonia* had been dedicated to the same Clinton; but that is unimportant. No one has ever admitted *Wittia* as a name, because, as Torrey said, that and the *Clintonias* are named for the same man.

I do not know that any case like the above was again furnished until some forty years later; but from about the time of the appearing of Mr. Otto Kuntze's Revisio this phase of degeneracy in nomenclature made a new beginning and has not yet met

[1]Pacific Railway Report, iv. 116 (1857).

with a line of adverse comment, or indeed of any comment of any kind. Not that I am at all certain of that learned author's having dedicated any two genera to the same person. I recall that, having suppressed the *Greenella* of Gray, he proceeded to make restitution by proposing another genus *Greeneina*. It also may be charitably suppposed that the authors of the very recently published name, *Greeneocharis* thought neither of the two others valid genera. If so, they are excusable on the ground of their not holding to the principle of the invalidity of revertible names.[1] But among those many Americans who have subscribed to this, and act accordingly, there is no condoning this violation of a law so plain that it never seemed to need formal and verbal enactment until within the last decade. But here with us it is time it should be considered and openly discussed. I do not know how many Washingtonias there have been. Perhaps a half-dozen or so; but I perceive that two dedicated to Washington are current in books of American botany, *Washingtonia* and *Neowashingtonia*, the latter doubly impossible in any but a weak and degenerate system of nomenclature. It is completely ruled out by the most rational code ever yet made, that of Linnaeus. It has seven syllables; the same number as *Lepidocarpodendron*, all the like of which Linnaeus suppressed, as well as many of only six syllables, as intolerably sesquipedalian. This should be treated the same way, not any more for this fault than for the other offense of its dishonoring rather than honoring the name of Washington.

I shall not attempt a list of genus names now current in botany that violate this unwritten law; but here are some of them: PORTERELLA, Torrey, valid, *Porteranthus*, Britton, illegal and to be displaced: BRITTONAMRA, Kuntze, *Brittonastrum*, Briquet.

I may give further attention to this important subject in a future paper. There are aspects of it not yet brought clearly into view; but let me conclude here with the suggestion more distinctly made, that to name one good genus after a man, as the ancients did for the kings Gentius and Eupator, or as later

[1]Pittonia, ii. 185 (1891).

authors have done for Caesalpino, Columna, Ray, Tournefort, Linnaeus, and then stop—*that* is to really *honor* a man, while to use his name as a merely convenient foundation for the making of a dozen different names—is not that to openly dishonor him?

I respectfully commend this topic to the serious consideration of the next International Congress of Botanists.

Certain Malvaeous Types.

The very many herbs and shrubs of far-western and southwestern North America that have been distributed between *Sphaeralcea* and *Malvastrum* are much in need of recension. Of this I have long been convinced; the conviction having come from a long study of the various types in their native soil; a much more prolonged acquaintance with them in this way than any other botanist ever has enjoyed.

The essential characters, no less than the strong habital peculiarities of several groups, have long been fixed in my mind; but I can not yet satisfy myself as to whether we have or have not a single species of real *Sphaeralcea* or a genuine *Malvastrum* in all North America. If these are wanting here, then we have at least two more North American genera of Malvaceae that remain undefined over and above those herein proposed.

Those that with us have been called Sphaeralcea species are of two ecologic groups, one of the arid districts of the far Southwest, companions of the Cactaceae, and geographically coextensive as a group, with that family, and the desert Salsolaceae. It is in this assemblage only that we find species with the habit of typical South American *Sphaeralcea.* That any of them have the floral or carpological characters of that genus is what I can not yet determine.

As widely different from this group in habit as can be, and also of totally different habitat, are the types of a few northwestern plants, at first called *Malva* species, but after that transferred to *Sphaeralcea.* The habitat of these is the banks or borders of mountain streams or other very moist places at consider-

able altitudes. They have a thin and ample foliage, quite green, usually appearing glabrous to the unaided eye, and the large whitish or purplish corollas which, together with the foliage, gives them the aspect of some Old World *Malva* and *Lavatera* species, from which they differ generically by their large truncate-subconic fruits, made up of 3-seeded dehiscent carpels. But the fruit characters by which these two American types are generically separated may be more easily recognized by means of a brief and less informal statement.

SPHAERALCEA, so called. Fruits small, from subtruncately broad-ovate to truncate-subconic, always densely stellate-tomentose, without other pubescence; carpels strongly fenestrate-reticulate laterally toward the base. Seeds stellate-roughened.

ILIAMNA, Gen. Nov. Fruits 3 or 4 times as large, subtruncate-ovoid, the stellate pubescence both fine and sparse, overtopped by long hirsute simple hairs; carpels marked by no kind of reticulation or venation on the sides. Seeds roughened by minute simple hair-points, or in one species quite hispidulous with longer and denser but simple hairs.

Of ILIAMNA, there are, I think, a considerable number of species yet to be given recognition over and above the old types. I shall merely indicate by name the old ones and define two that are clearly new, in so far as I can ascertain.

I. RIVULARIS. Dougl. in Hook. Fl. under *Malva*.

I. ACERIFOLIA. Nutt. in T. & G., under *Malva*.

I. ANGULATA. Three feet high or more, the stem moderately stellate-pubescent; leaves with 3 to 7 lobes, all very broad and short, broadly triangular, the sides about equal, the margins of the lobes either very saliently or else slightly dentate; segments of calyx long, ovate-lanceolate, even somewhat acuminate; corollas large, apparently white: fruit not seen.

In the Uncompahgre Cañon, southern Colorado, Aug., 1887, Miss Eastwood; type in U. S. Herb..

I. REMOTA. *Sphaeralcea acerifolia*, Gray, Syn. Fl., i, 317 in part, and wholly as to the Illinois plant. Very large, nearly 6 feet high, bushily branched from base and throughout; stems and foliage quite densely stellate-pubescent; leaves of firmer

texture, the larger 7 inches wide and as long, of orbicular outline, but with from 5 to 7 triangular lobes; these broadly, obtusely but mucronulately dentate; calyx cleft into ovate-acuminate lobes; corolla large, light rose-purple; seeds distinctly and not sparsely hispidulous.

Inhabits an island in the Kankakee River, Illinois, some twelve or fifteen miles above the city of Kankakee and just opposite a small village called Altorf; this the only known locality for this species. While by its dense pubescence it is next of kin to the real *I. acerifolia* (excluding *I. rivularis*), it is specifically distinct by characters of calyx and seed; also as distinct from all others by its remarkable habit, being a large and bushy plant, all its congeners being few-stemmed and often without a branch. By the extreme distance intervening between the habitat of this local plant of eastern Illinois and that of its nearest congeners, which are of the Rocky Mountain region, any well travelled American botanist would know that this plant could not represent any Rocky Mountain species. The isolation of it is so complete that one does not see how any "authority" could readily have pronounced it to be referable to a Pacific coast mountain species, even if it had not its two or three good characters.

As far as the herbarium specimens here used are concerned, they are all of my own collecting, at the place where Mr. Hill, who first brought the plant to knowledge, collected his. The date of my visit to the spot was 1 Aug., 1899.

As consisting of a medley of incongruities, *Malvastrum*, as received in North America hitherto, is more confused than *Sphaeralcea*; and that there exists so much as one real *Malvastrum* north of the Mexican border I hold to be most doubtful. I shall here indicate but two new genera of this aggregate. The characters of one became clear to me a dozen years since, when I had several of the species in cultivation at the University of California. All of them are shrubs, and with long branches—in most species densely tomentose—usually flexu-

ous or tortuous and recurved, beset at intervals with densely subcapitate clusters of flowers, one cluster in the axil of each leaf, the leaves often subsessile. Corollas large, white or pinkish or purple. Calyx large, commonly concealed altogether by a very thick and dense coat of tomentum. Fruits as depressed and low as those of any *Malva*, the carpels not very tomentose, their sides without reticulation, one-seeded, promptly dehiscent, the two perfectly distinct valves falling away separately together with the ripe seed.

The genus thus defined has a number of described species, and perhaps an equal number undescribed. I denominate it MALACOTHAMNUS, and with the species I shall here do little beyond indicating the most typical, or in other words fixing the type of the genus.

M. ARCUATUS. Greene, Man.,	under	*Malveopsis.*
M. FREMONTII. Torr.,	"	*Malvastrum.*
M. ORBICULATUS. Greene, Fl. Fr.,	"	"
M. DAVIDSONII. Robinson,	"	"
M. PALMERI. Watson,	"	"
M. ABORIGINUM. Robinson,	"	"
M. DENSIFLORUS. Watson,	"	"
M. MARRUBIOIDES. Dur. & Hilg.,	"	"
M. FASCICULATUS. Nutt. in T. & G.,	"	*Malva.*

The second is a small group of desert annuals, the habital and floral peculiarities of which are given in Gray's Synoptical Floral under an asterisk and as heading the whole line of Malvastra, the subsectional adjective employed being *Pedunculosa.* I assign this series the generic name EREMALCHE.

E. ROTUNDIFOLIA. Gray,	under	*Malvastrum*
E. PARRYI. Greene,	"	"
E. EXILIS. Gray,	"	"

From my way of viewing things, the genus *Sida*, as set forth by Bentham and adopted by Gray, is less mixed by diversity of types than is *Malvastrum*; yet here also, the section defined by Gray and named by him Pseudo-Malvastrum, is to my mind

more distant from *Sida* than from *Malvastrum*. As a genus I designate this group DISELLA.

D. HEDERACEA. Dougl. in Hook. Fl., under *Malva*.

D. LEPIDOTA. Gray, " "

D. SAGITTIFOLIA. Gray, " *Sida*.

D. CUNEIFOLIA. Gray, " "

The herbaria show a number of undescribed species of this genus.

The Genus Nuttallia.

When in the year 1891 I sought to invest a favorite drupaceous genus, then called *Nuttallia*, with a name that should not be revertible, proffering *Osmaronia* as new, and therefore securely tenable, I was careful to point out that there had been already five different applications of *Nuttallia* to as many plant genera, and also bold enough to prophesy that the Loasaceous type to which it was first applied by Rafinesque in 1818 would some day be restored to proper rank as a genus and would claim the name. This piece of bibiliographic information, it may be assumed, was never read, or if read forgotten by those who as if unwittingly have fulfilled my prophecy, for the type in mind was removed from *Mentzelia* in 1891 under a new name, *Hesperaster*.[1] Three years later another botanist, reasserting the generic rank of the group, and finding *Hesperaster* to be a synonym, presented the species all in line under a name sixty years older than *Hesperaster*, namely, *Touteria*.

I made each time mental note of the attempt to invest this group with a tenable name, and knew the futility of each attempt; but it was not the time for me to speak, as I thought, particularly as I had already published, ten or a dozen years before, all needful instruction for those who might be out in quest of *the name* for Pursh's homonymous *Bartonia*; and so I now gladly avail myself of the opportunity of making restitution to the memory of Nuttall, whose once currently-accepted genus I fifteen years ago discovered untenable and displaced.

The following is a partial list of the published species of NUTTALLIA:

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[1]Torreya i. 142.

N. DECAPETALA.	Pursh,	under *Bartonia.*
N. NUDA.	"	" "
N. MULTIFLORA.	Nutt.,	" "
N. LAEVICAULIS.	Dougl. in Hook,	" "
N. PARVIFLORA.	" "	" "
N. CHRYSANTHA.	Engelm,	" *Mentzelia.*
N. PTEROSPERMA.	Eastw,	" "
N. WRIGHTII.	Gray,	" "
N. BRANDEGEI.	Wats,	" "
N. DENSA.	Greene,	" "
N. LUTEA.	Greene,	" "
N. PUMILA.	Nutt.,	" "
N. SPECIOSA.	Osterh.,	" "
N. STRICTA.	Osterh.,	" *Hesperaster.*

The Genus Bossekia.

Necker was among those early in the field of championship for multitudinous good genera which Linnaeus had of late been so bold as to suppress. He must needs have taken up the case of the Linnaean aggregate *Rubus*, and in doing this he left in *Rubus* what for centuries before Linnaeus had constituted the genus, namely the shrubs with compound leaves and clustered flowers. *Dalibarda* he restored in deference to its simple leaves and monanthous peduncles. He also so defined it as that it might include the still older genus *Chamæmorus*, which, by the way, was not regarded as either a blackberry or raspberry, but as a mulberry, the very name telling us this.

Upon the one remaining simple-leaved Linnaean *Rubus* he sought to establish a new genus, calling it BOSSEKIA (Neck. Elem., ii, 91.) Mr. Rydberg must be credited with having fortified this genus by some new characters, and I for having relieved it of a name so cheap and ill-made as *Rubacer*, the author of which might have avoided the framing of any new name at all, had he learned, as I have, by long experience, to distrust the Kew Index as to what genera have been published; for there are, perhaps, some scores

of generic names—*Bossekia* among the rest—of which the authors of that nevertheless invaluable treasure of learning had no knowledge. It is but one of not a few names for genera which do not appear among the synonyms even.

Even as to the intended meaning of it *Rubacer* is a failure; for the purpose must have been that of saying in Latin Maple-leaved Raspberry, and what is said is Red Maple; for "acer" is the substantive and "rub" is but the qualifying adjective. The author himself has placed this beyond dispute, unwittingly to be sure, by giving neuter endings to the trivial names, such as are always given in *Acer* but never in *Rubus*.

The following are the early species of BOSSEKIA:

B. ODORATA. Cornut. Canad, under *Rubus*.

B. PARVIFLORA. Nutt. Gen., " "

New Plants from New Mexico.

RANUNCULUS NUDATUS. Stems mostly solitary, erect from an unusually large fascicle of fleshy-fibrous roots, naked and simple below, parted near the middle into a few strict often subumbellate flowering branches: radical leaf often solitary, on a long and slender petiole, pedately 5-parted, the divisions trifid, their segments oblong to oblong-linear, obtuse, those subtending the peduncles sessile, of 3 linear entire divisions, both stem and leaves sparsely villous-hairy; sepals thin, ovate, villous-hairy, caducous, not reflexed; corolla yellow, ¾-inch broad; petals 5 to 8, obovate-oblong to oblong; achenes not seen.

Burro Mountains, at 7,500 feet, O. B. Metcalfe, 20 June, 1903. Of peculiar habit, but related to *R. acriformis* of Wyoming.

ERIGERON DEUSTUS. Perennial, slender, freely branching, 6 or 8 inches high, minutely hirtellous-strigulose; leaves about an inch long, oblanceolate, acute, entire; heads scattered, terminating slender pedunculiform branches; involucres nearly hemispherical, 4 lines broad, not as high, their bracts equal, acute, sparsely hirtellous; rays 60 or more, very narrow, purplish; achenes not seen.

West Fork of the Rio Gila, 28 Aug., 1903, O. B. Metcalfe. A member of the group of *E. divergens*.

SENECIO CYNTHIOIDES. Perennial, tufted, with habit of *S. Fendleri*, but foliage entire, pale, glabrous above and strongly glaucous, narrowly oblanceolate or almost linear, obtuse or acutish, beneath tomentulose, the cauline reduced and few; cymes and heads as in *S. Fendleri*, rays much longer, pale-yellow; achenes light-colored, glabrous, oblong, obtusely 5-angled, and with more than twice as many obscure intervening striae.

Hillsides along Turkey Creek in the Mogollones, 23 Aug., 1903, O. B. Metcalfe; a plant with pale entire leaves, recalling certain cichoriaceae.

SENECIO MOGOLLONICUS. Perennial, with tall stems decumbent at base, then upright, ending in a single large head: basal leaves spatulate-oblanceolate, the lowest and largest 4 inches long, without clear distinction of blade and petiole, of firm texture, entire, green, though slightly flocculent on both faces, those of the upper and pedunculiform part of the stem reduced, lance-linear; head ¾-inch high, broadly turbinate; rays few, small, and inconspicuous for so large a plant, deep-yellow; achenes not seen.

Dry flats on the West Fork of the Gila, 7 Aug, 1903, O. B. Metcalfe. The species is related, but not closely, to *S. Actinella*.

SENECIO PRIONOPHYLLUS. Size and habit of *S. Balsamitae*, the stem more nearly naked and subscapiform; the plant glabrous, or with but traces of flocculent indument: basal leaves with slender petioles 2 or 3 inches long, blades 1 or 2 inches, oblong and obovate-oblong, closely serrate rather than crenate, none lobed or pinnatifid, wholly glabrous; cauline few, much reduced, sessile, pinnatifid; heads few, larger than in *S. Balsamitae*, rays shorter; achenes glabrous, light-colored, 5-angled, and with 5 alternating slender ribs.

Moist flats on the west Fork of the Gila, in the Mogollones, 7 Aug., 1903, O. B. Metcalfe.

TOWNSENDIA FORMOSA. Perennial, spreading by short stout stolons, the sterile ones ending in a rosette of leaves, the others in a stout upright very leafy monocephalous stem: basal leaves cuneately to spatulately obovate, very obtuse, entire, ¾ to 1½ inches long, of thin texture, glabrous, except as to the prickly-ciliolate margins, those of the stem crowded and somewhat imbricated, spatulate-oblong: heads large, 2 inches broad from tip to tip of the broad purple rays: bracts of involucre oblong to lanceolate, thin, broadly scarious-margined.

In the Black Range, in the spring or early summer of 1903, O. B. Metcalfe; specimens sent to me under n. 1434.

HEDEOMA PULCHELLA. Dwarf many-stemmed perennial, at very base suffrutescent, the stems though tufted usually simple, leafy, floriferous from the base, 3 to 5 inches high, all the growing and flowering parts villous-hoary, leaves ¼ inch long, ovate, very acute and sharply few-toothed above the middle, flowers very large for so small a plant, 2 or 3 in each axil; calyx strongly bilabiate, the slender-subulate teeth and the tube all equally and strongly hirsutulous: corolla lavender-colored, more than ½ inch long, the tube slender, long-exserted.

Limestone hills at about 6600 feet near Kingston, 18 May, 1905, O. B. Metcalfe, n. 1599. The most beautiful and large-flowered of dwarf species.

UROPAPPUS PRUINOSUS. Annual, stout, low, subacaulescent, 6 to 10 inches high: leaves but half the length of the scapiform peduncles, consisting of a linear rachis and remote narrowly linear segments, the whole, and also the lower part of the peduncles more or less hoary with short papilliform and some longer and curled white hairs: fruiting heads barely an inch high: achenes short, subcylindric, tapering but slightly, of only half the length of the pappus, paleae of the latter very deeply bifid, the bristle long in proportion.

Common winter annual of southwestern New Mexico and adjacent Arizona, hitherto referred to *U. linearifolia* of the Pacific seaboard; thoroughly distinct by its short achenes and comparatively long pappus, the achenes not beaked, etc. The

best specimens before me are of my own collecting in 1877, and a sheet by Mr. Metcalfe in 1905.

SENECIO QUAERENS is a name that may perhaps be found tenable in place of that of my second *S. prionophyllus* namely that of page 212 preceding.

New Species of Viola.

During the three seasons last past, in relation to our acaulescent violets I have done some field study, some collecting, and not a little silent reflection upon the whole subject, and not so much of writing and publication. The defining of new forms, as well as wise or unwise commentation upon many somewhat newly published I have for the most part left to a number of people who, all of them new in this field as compared with myself, are not yet checked by lack of confidence in the sufficiency of their own knowledge.

In the course of some journeyings made in the month of May, 1902, through Western Maryland, northern Ohio and southern Michigan, I took something like alarm at the great number of undescribed violets that I encountered; and to these were added in my thought not a few forms common in the valley of the Potomac near Washington which I had not yet dared to publish, though I had been studying them, but only too interruptedly, since the year 1896.

One or two of the settled conclusions I seem to have reached during these three seasons of more silent study I may here briefly state.

I think that the number of valid species of so-called acaulescent violets in the United States is very great; that it may amount, eventually, to some hundreds.

I have not the least faith in the existence of any hybrids in this group. Certainly not one case has been proven. Quite a number have been guessed at; not one of them with what to me is the least show of reason or probability. That which to any scientific mind should preclude even any guessing at hybrids, or almost any hope of finding such in the field is the simple fact that 99 out of 100 seeds of these plants are from flowers that

having no corollas, never open even their sepals; which flowers are even in a majority of cases developed under the ground, the capsules not rising to the surface of the soil until the day approaches for the scattering of the ripe seeds. It is a remarkable phase of science, a strange method of induction, by which men can convince themselves of the existence of hybrids—even the common occurrence of them—in a group of plants which, as if intelligent entities, seem to use every thinkable natural precaution against cross fertilization.

VIOLA FILICETORUM. At petaliferous flowering low, 3 or 4 inches high, the flowers barely surpassing the foliage: earliest leaves subreniform, ¾ inch long, crenate, plane, subsucculent, purple beneath, those next succeeding subcordate, obtuse, 1¼ inches long, nearly as broad, glabrous, as are all the vegetative organs at every period, sepals oblong-oval, very obtuse, with distinct and evident scarious margin, this when fresh minutely serrulate as seen under a lens; corolla violet, not of the largest, the petals all very obtuse, the odd one as long as the others and almost truncate. Plant of early summer a foot high and even more, with vivid green thin and delicate leaves subcordate-deltoid, 2½ inches long, 3½ broad across the base, crenate: apetalous flowers on most delicate filiform horizontal and subterranean peduncles 2 to 4 inches long.

Species peculiar to deep woodland shades along the Potomac above Washington, where it is very common in a narrow belt along the summits of such slopes as are occupied by the Christmas Fern, sometimes along the bases of such declivities, and not rarely in among the ferns. It is plentiful about Cabin John Bridge, in Maryland, and also just outside the District line, in the same region. I have observed it and collected it in these and other localities at various dates during five years past. It is in good petaliferous flower about 20 April. In its extremely different dress of the latter part of May and in June no one not acquainted with the species would suspect it of being identical with the little dwarf of April with the petaliferous flowers.

To this I must append some account of what I shall call its Var. PARTHENICA. Earliest foliage larger, thinner, not purplish beneath, transversely elongated, but hardly subreniform, being subtruncate across the base; sepals narrower, as also the petals in the same degree, and these rather bluish than violet, and in most specimens definitely but narrowly whitish-margined, the odd petal very decidedly shorter than the others.

More open wooded slopes and summits on the Virginian side of the Potomac not far from the Chain Bridge; collected by me and notes taken 3 May, 1906.

VIOLA INDUTA. Of the low stature of the preceding at first, and with like small subreniform early leaves, the petioles of these but not the blades hirtellous, the peduncles of petaliferous flowers almost filiform and quite glabrous: sepals lance-oblong, obtuse, closely ciliate with short, stiff spreading hairs: corolla small for this group, usually blue, rarely purplish or violet, the petals subequal, all but the odd one very distinctly and rather deeply emarginate. Plant in summer state not large in proportion, 8 or 10 inches high, copiously leafy and the leaves light-green, of firmer texture, their petioles hirsute, even hoarily so when seen standing and fresh, blades broadly subcordate and emphatically cucullate, when pressed out appearing somewhat roundedly deltoid-subcordate, the length and breadth equal, 2½ inches: peduncles of apetalous flowers, short and very stout when buried, or when above ground still short and stoutish, ascending or horizontal.

In rather open ground bordering woodlands, commonly on open banks, always in soil of red clay mixed with sand; this at various stations among the hills outside the District line in Maryland; near the bridge over Powder Mill Branch quite copious; petaliferous flowers in the latter part of April, my specimens 21 April, 1906; of summer stage May and June of former years and also this season; apparently first obtained by me near Cabin John, in clayey-sandy bottom land ten years ago, that is, in 1896, 31 May, all the specimens being in the summer stage.

V. EMARGINATA, var. SIMULATA. Plant of the size, habit and also exactly the leaf outline of V. *sagittata*, but of the deep color, peculiar smoothness and subsucculent texture of V. *emarginata*; in summer stage 7 to 9 inches high, with petioles thrice as long as the blades, these 2 to 3 inches long, 1½ inches broad across the quite roundedly sagittate base: petals narrower than in the type, not emarginate: capsules from apetalous flowers obovoid, ½ inch long.

On steep openly wooded slopes looking westward in Rock Creek Park, D. C., May 7 and 31, 1906, collected by the writer; no typical plants found in the vicinity, nor even as yet by me in any part of Rock Creek Park or its outlying hills.

V. VESPERTILIONIS. Rootstock stout, simple, at petaliferous flowering with about 3 leaves and 2 flowers, rarely more, all long-stalked and very erect, the peduncles slender and glabrous the petioles stout and villous-hirsute, the plant at this stage 3 to 6 inches high, its earliest blades cordate and subreniform-cordate, the one developing with the corolla larger and commonly hastate-lobed, never palmate; sepals subfalcate-oblong, obtuse, strongly hispid-ciliate toward the base; corolla rich violet, ¾ inch long and the petals broad. Plant in early summer with the one or two newer leaves extremely large, variously reniform in general outline, in robust plants 4 to more than 6 inches wide and only 2 or 2½ in length, often not lobed but coarsely crenate-toothed, more usually deeply 3-lobed, sinuses nearly or quite closed, the petioles of these leaves not villous, only sparingly hairy, but foliage pubescent, plant at this stage commonly a foot high, or even more; the few apetalous flowers short-peduncled and, with the capsules, subterranean.

Common in certain woods of the Potomac Basin in Maryland, Virginia and D. C., my type specimens from about Brookland, D. C., April, May and June, 1897. I have never until now given this plant any specific name at all in my herbarium. The less cautious, and they who must first of all have a name for a form, have called this *V. palmata*, and *V. palmata* var. *dilatata*. The only violet that can with any degree of propriety

LEAFLETS, VOL. I, pp. 217-220. June 16, 1906.

be called *V. palmata*, Linn. is very different from this, and is palmated, which *V. vespertilionis* never is. There are other names, *V. asarifolia*, Pursh, and *V. congener*, Le Conte, that may perhaps embrace among other different forms, this also.

V. ORNITHODES. Mode of growth as in the last, the leaves and flowers as few and strict, all far more slender, even taller, 5 or 6 inches high, the petioles long-villous, but not densely so; foliage at all stages much smaller, the very earliest reniform, the leaf accompanying the flowers, lobed but cucullate, concealing its lobes; corolla more than an inch long, its petals narrower, spatulate-oblong, the sepals also longer and narrower and nearly or quite devoid of ciliation. Summer state of plant not large in proportion, 7 to 10 inches high, the foliage various, but configuration always peculiar, the undivided leaves somewhat triangular or even semiorbicular, the largest hardly 2 inches wide, the divided ones always or nearly always 3-lobed or -parted, with middle lobe largest, oval or oblong, subentire, the pair spreading away from this, leaving almost rectangular sinuses, crenate on the outer margin and curiously bird-wing-like in cut, the leaf as a whole suggesting the outline of a bird with spread wings.

On open hills bordering woods and looking eastward, in Rock Creek Park, D. C., also in like situations on the Virginian side of the Potomac, below Chain Bridge, April to June, 1906.

The relations between these two types last defined I, of course do not know. They may be subspecific descendants of some other type known or unknown. They are not, I think, varieties one of the other. Each of them, now after long study, confirms me in the view I took when studying that kindred plant of the mountain sides above Harper's Ferry, which I called V. *variabilis*, namely, that one must allow in this group, without even varietal distinction, plants with all leaves undivided, and other plants with leaves all, and variously, cut or cleft or lobed.

V. FONTANA. Larger plants 9 to 11 inches high at petaliferous flowering, the flowers surpassing the foliage by an inch or more; herbage light-green, glabrous, subsucculent: leaves cordate-ovate, obtuse, about 2½ inches long, a little wider than that across

the strongly cordate base, not cucullate, the broad lobes meeting or nearly meeting, but plane, not involute, the whole margin remotely and lightly crenate: peduncles unusually stout and fleshy, their bractlets supramedial, alternate: sepals much elongated, lance-linear, lightly serrulate: corolla deep-blue, its width ¾ inch or more, and greater than its length, the odd petal being much shorter than the others, all obtuse. Summer state of plant not enlarged, its apetalous flowers few, short-peduncled, their capsules not seen; the one latest petaliferous on each plant producing a small capsule with few seeds.

This handsome violet of open grassy places about springs and along streamlets flowing from springs, was first brought to my notice about five years since, the specimens having been brought in quantity from a locality at the sources of Rock Creek, just outside the District of Columbia, in Maryland. I then saw that it was new, but declined at that time to give any account of it. This season I have chanced to come upon extensive masses of it, growing amid grasses, sedges and some hydrophilous moss, on a tributary of Rock Creek within the District, and having studied it *in situ* to my satisfaction, have decided to give it a name and diagnosis. It was in perfect petaliferous flower 7 May, 1906.

Parthenocissus a Synonymn.

Among the numerous medley genera of Linnaeus not many are more impossible than his *Hedera*, composed as it is of two species, one the Old World ivy, the other an American grape. Tournefort more than a half-century earlier had determined Cornut's five-leaved ivy to be a grape and not an ivy, and had named it *Vitis quinquefolia;* and this Tournefortian disposal of the species met with almost universal approval for nearly a century, notwithstanding Linnaeus' retrograde proposition; for after 1753 Adanson, Moench, Gaertner and others retained the Virginia Creeper in *Vitis*, while only Crantz and Miller stood by Linnaeus in calling it a *Hedera*.

Necker, in 1790, appears to have been the first to indicate this shrub as the type of a proper genus.

I have been unable to ascertain that any authority upon genera or generic nomenclature, whether of the nineteenth century or the twentieth, has hitherto discovered this. Every one of them seems to have been misled by the name PSEDERA, Neck. This is really *Pseudohedera* with certain syllables eliminated, partly for the sake of brevity, but more for the purpose of keeping it from falling under the ban of that excellent article of Linnaeus' Code which prohibits the use of generic names formed by prefixing *Pseudo* to another name. The name itself, therefore, must have beguiled the superficial into guessing that PSEDERA is some segregate of *Hedera:* and this guess has found expression in certain well known bibliographies. But the authors can hardly be supposed to have looked beyond the mere name itself. The character ascribed to PSEDERA by Necker is in accord with that of Planchon's *Parthenocissus* in all essentials. But what places my identification of PSEDERA with *Parthenocissus* beyond all cavil is the circumstance of Necker's having stated one of Linnaeus' *Hedera* species to be its type; for of that genus the species, with Linnaeus, are but two.

Only the American species of PSEDERA at present concern me.

P. QUINQUEFOLIA. *Hedera quinquefolia,* Cornut (1635), Linn. (1753), Mill. (1768). *Vitis quinquefolia,* Tourn. (1700), Lam. (1793), Moench (1794).

P. HIRSUTA. *Ampelopsis hirsuta,* Roem. and Schultes (1819).

P. VITACEA. *Parthenocissus vitacea,* Hitchc. (1894).

P. TEXANA. *Parthenocissus Texana,* Rehder (1905).

P. LACINIATA. *Ampelopsis quinquefolia* var. *laciniata,* Gray in Planchon (1887.)

New Western Plants.

Senecio orthophyllus. Suffrutescent, the woody basal branches stout, rigid, obscurely angular, white-tomentulose; flowering branches a foot long, very erect, loosely leafy, subcorymbose at summit, all the leaves linear, entire, obtuse, revolute, the principal ones 2-3 inches long, erect, even almost appressed to the branch, the axils of the lower bearing crowded fascicles of a foliage short but otherwise similar, the whole white-tomentose, even to the involucres, these less than ½ inch high, subcampanulate: rays nearly ½ inch long, yellow, not numerous.

Willow Springs, Arizona, 1890, Dr. Edw. Palmer, n. 479 as in U. S. Herb.

Senecio Monoensis. Woody at base, with many striate-angled stems decumbent, 1½ feet high, rather sparsely leafy, of a rather light green, the plants glabrous in all its parts; leaves made up of a filiform-linear rachis and few as narrowly linear remote acute segments: heads large, in a loose subcorymbose panicle; involucres broadly subcylindric, ½ inch high, notably calyculate-bracted at base, the main bracts narrow, linear, acuminate: rays rather many and conspicuous, clear yellow.

White Mountains of Mono Co., Calif., on slate hills near Southern Belle Mine, 25 May, 1906, A. A. Heller, n. 8330.

Senecio Leibergii. Stems solitary, very erect from the crown of a fascicle of fibrous roots, 1½ feet high, rather slender, simple, ending above in an ample fastigiate corymb of larger than middle-sized heads: leaves mainly basal, thin, plane, oval-elliptic or elliptic, nearly entire, almost glabrous, 2½-3½ inches, long, on slender petioles of more than equal length, the scattered cauline leaves lance-linear, sessile, sharply denticulate somewhat arachnoid-hairy as also the stem and inflorescence: involucres short-cylindric, bracts oblong-linear, acuminate: rays many, white: achenes acutely few-angled, light-colored, glabrous.

Leaflets, Vol. I. pp. 221-228, Sept. 8, 1906.

Granite bluffs of the Pend d'Oreille River, Kootenai Co., Idaho, May, 1906, collected by Mr. and Mrs. John B. Leiberg. More tall and slender than other members of this group, and noteworthy on account of its "chalky-white" rays.

ERIGERON TEPHRODES. Perennial, the tufted stems from a not large tap-root, all rigidly ascending, 6 or 8 inches high, sparingly branching, freely and loosely floriferous, the whole herbage densely cinereous-hirtellous: basal leaves twice as long as the rameal, all narrowly oblanceolate, entire, acutish: heads with hemispherical involucre less than ½ inch broad in expansion, of very numerous dull-white narrow rays ¾ inch or more: pappus to unaided eye simple and of few delicate long bristles, a good magnifier disclosing an equal number of very short accessories even more slender.

Foothills west of Bishop, Inyo Co., Calif., 23 May, 1906, A. A. Heller, n. 8315 as by him distributed. In aspect somewhat intermediate between *E. concinnus* and *divergens.*

A New Genus of Rutaceae.

TARAVALIA. Differing from *Ptelea* by subumbellate or corymbose few-flowered inflorescence, pentamerous flowers and a thick nut-like wingless fruit; the pericarp neither rugose nor reticulate, but roughened by closely compacted low tubercles, also tardily dehiscent, separating into two concavo-convex valves.

Genus as far as known endemic on the Mexican Territory of Lower California, and dedicated to the memory of Sigismund Taraval, who in the year 1730 explored much of Lower California and was the first to visit the large outlying island now called Cedros, and to make some report upon its topography and natural history.

The known species of the genus are three only.

T. APTERA. *Ptelea aptera*, Parry in part. *P. aptera*, Greene, Contr. U. S. Herb., x. 76. Pericarp small, round-ovate, its margin acute.

Maritime hills at Punta Banda, northern L. Calif.

T. OBSCURA. *Ptelea obscura,* Greene, l. c. Pericarp large, subquadrate-oval, its margin obtuse.

Interior of northern L. Calif., near Santo Tomas.

T. NUCIFERA. *Ptelea nucifera,* Greene, l. c. Fruit large, oval, sharply carinate all around the margin.

Near a desert water hole, middle of L. Calif., inland.

The Genus Leiostemon.

When nearly thirty years since in New Mexico I for the first time saw the type of this genus, not knowing its name, I regarded it as possibly a *Gerardia,* never thinking of *Pentstemon* at all in connection with it, so far removed as it is in habit and in the structure of its flower from the last named. I was therefore not well satisfied when I learned that its only name in botany was *Pentstemon ambiguus*; the trivial name also telling the tale of Torrey's own doubt about the reasonableness of the placing of it as a species of *Pentstemon.*

Within the last year, having been led to examine and compare a series of specimens from different places, I reached the decision that the type ought to be excluded from *Pentstemon* and given the rank of a genus. I could not readily invent a pleasing generic name for it, and the subject passed out of my mind. This may have been fortunate; for, in reading lately some botanical articles by Rafinesque in the Atlantic Journal, I came upon his establishment of this type in the rank it demands, and with a name that may easily pass without any objection that I can see.

The species of LEIOSTEMON seem to me to be two at the least, with possibly as many more.

L. AMBIGUUS. *Pentstemon ambiguus,* Torr. *L. purpureus,* Raf.

L. THURBERI. *Pentstemon Thurberi.* Torr.

The Genus Batanthes.

This, as set forth by Rafinesque in the Atlantic Journal, p. 145, is not a genus, but an aggregate of three. My own usage in such cases, however, has been that of those who hold that the name of a genus stands or falls with that of the first species enumerated under it, unless the character given excludes such first species and points to one of the others as having been the author's type species. In the present instance the character is equally that of all three of the included species. One must, then, either suppress the name BATANTHES, or else support it for that genus of which *Cantua aggregata* of Pursh is the oldest type. This will reduce to synonymy *Callisteris*, of page 159 preceding, the known species of which may take names as follows under BATANTHES.

B. AGGREGATA, Raf., Atl. Journ., 145, *Cantua aggregata*, Pursh; probably not *Callisteris aggregata*, Greene, Leafl., I, 159, for Mr. C. V. Piper, who has given careful attention to the localities of many of Pursh's types, tells me it is certain that *Cantua aggregata* came from the Pacific slope of the continent.

B. SCOPULORUM. *Callisteris aggregata*, Greene, l. c. excl. syn.
B. COLLINA. Greene, l. c. under *Callisteris*.
B. LEUCANTHA. " " "
B. ATTENUATA. " " "
B. FORMOSISSIMA. " " "
B. FLAVIDA. " " "
B. TEXANA. " " "
B. ARIZONICA. " " "
B. BRIDGESII. " " "
B. PULCHELLA. " " "

Four Streptanthoid Genera.

This is a continuation of studies published in part on pages 81 to 90 preceding. In those paragraphs only the Californian streptanthoid types are dealt with. All the genera now proposed

belong to the arid interior; the species of one of them ranging between Arizona and Texas, not far to the northward of the Mexican boundary; those of another, far more numerous, occur at many different stations all the way between the Rocky Mountains of Colorado and Wyoming on the one hand, to the Cascades and Sierra Nevada on the other. A third is typically Californian.

The genus of altogether southerly range I name

DISACCANTHUS. Calyx of thin texture, but not as in *Euclisia*, inflated in the middle and closed at the summit, two larger sepals distended at base and saccate. Pods broad and flat; seeds broad thin, wing-margined. Plants of a thinnish foliage, the basal leaves (early disappearing) runcinate-pinnatifid, and forming a rosulate tuft, the cauline cordate-amplexicaul.

The few species may take names as follows:

D. CARINATUS. *Streptanthus carinatus*, C. Wright. Calyx purple, all four sepals saccate, and more notably so than in other species. Pods 2¼ inches long, 2 lines wide.—The original from a cañon 60 miles below El Paso, Texas.

D. VALIDUS. Plant stout, rigid, with few rigidly ascending branches: pods oblong-linear, very large, 1¾–2 inches long, fully 4 lines wide, obtuse. —Type from somewhere in western Texas, 1884, by M. E. Jones, who mistook it for *Streptanthus platycarpus*, Gray.

D. MOGOLLONICUS. Calyx very thin, creamy white, sepals less notably saccate: pods 3 inches long, barely a line wide.—Type collected by myself among foothills of the Mogollones in New Mexico, 30 March, 1881. All white-flowered material from New Mexico from Las Cruces to the upper Gila belongs here.

D. LUTEUS. Flowers wholly of a clear yellow.—A more northerly species, of the Black Range, New Mexico, known only in flowering specimens collected in 1905 by O. B. Metcalfe.

D. ARIZONICUS. *Streptanthus Arizonicus*, Wats. Plant more delicate than in other species; no rosula if basal leaves; stem slender, simple; flowers nearly white.—Mountains of southern Arizona.

In a paragraph beginning on page 87, preceding, I have already outlined a group which I shall proceed to discuss under the new generic name CARTIERA. These are very far removed from *Disaccanthus* in habit, being perennials, and having a thick foliage which in texture is intermediate between coriaceous and succulent, and is either entire or merely toothed. On the stem under the inflorescence the scattered foliage takes the form of large cordate bracts, in this recalling *Pleiocardia*, as I said. The calyx is closed, its sepals thick and subsucculent, very often showing the peculiarity of a few spinulose or bristly hairs at tip, just below a narrow scarious margin. The pods are large, flat, filled with seeds not so thin, but usually wing-margined.

The following is a partial list of the species of CARTIERA:

C. CORDATA. Nutt. in T. & G. Fl. under *Streptanthus*.

C. CRASSIFOLIA. Greene, Pitt., iv, 227, " "

C. ARGUTA. Greene, " " " " " "

C. HOWELLII. Wats. Am. Acad. xx, 353, " "

C. BARBATA. Wats. Am. Acad. xxv, 125, " "

C. MULTICEPS. Leafy caudex much branched, surmounting a long taproot: basal leaves round-obovate, less than 1 inch long, sharply serrate-toothed: flowering stems simple, 4–6 inches high, their many leaves oval, entire, sessile, clasping, all the herbage glabrous, very glaucous: pods linear, more than 3 inches long, 1 line wide, slightly curved upwards: seeds oval, narrowly winged.

Guano Ranch, Harney Co., Oregon, 24 July, 1896, Coville & Leiberg, n. 2, as in U. S. Herb.

C. LEPTOPETALA. Size of the last, not multicipitous, herbage thinner, less glaucous: lowest leaves spatulate-obovate, toothed across the summit, the cauline subquadrate-oblong, 1½ inches long, acute, often toothed at apex, flower more than ½ inch long, limb of petals very long and narrow; tips of sepals prickly: pods unusually narrow, 2–3 inches long.

Stein's Mountain, Oregon, W. C. Cusick, July, 1898, n. 2002 as in U. S. Herb.

In the *Streptanthus* of Gray's Synoptical Flora several species found place which do not fall naturally into any of the segregate genera proposed by me. The following seem to need mention.

S. platycarpus, Gray. This is unknown to me except by description. By the character of its broad petal-blades it should belong just where it has hitherto been placed, in *Streptanthus*, though the pods are small for that genus.

S. Lemmoni, Wats., is altogether too imperfectly known. From the description of the calyx it can not be an *Euclisia*. It is also wholly beyond the range of that genus. It might be an *Icianthus;* but there is no telling.

S. longirostris, Wats. Since I came to know the living plant in its native deserts I have considered Mr. Watson's first disposal of it under *Arabis* as less objectionable. At not one point of floral structure is it in contact with *Streptanthus* or with any one of its segregates; but there are not wanting points of agreement with *Arabis* as now maintained. The sepals are equal, all four alike, loosely somewhat spreading (ascending), enclosing short petals that show no distinction of blade and claw. Quite such flowers are in *Arabis* here and there; but in this last named group we have no rostrate siliques. For a recurrence of this carpological character we look to certain other far-western plants which, following my suggestion of many years ago, have been received into *Thelypodium*. Habitally also the present type harmonizes with "*T. lasiophyllum*," and this so perfectly that for years I have been regarding the little annual of interior deserts as a natural descendant of *T. lasiophyllum*, hence congeneric with it. I now propose the separation of that Californian type already in past history referred to so many different genera, and in commemoration of an eighteenth century explorer of California shall name it

GUILLENIA. The more typical species are

G. LASIOPHYLLA. Hook. & Arn. under *Turritis*.

G. RIGIDA. Greene, under *Thelypodium.*

G. INALIENA. Robinson, " "

G. ROSTRATA. Watson, " *Arabis.*

G. COOPERI. " " *Thelypodium.*

Despite its likeness to *G. rostrata,* and its desert habitat, the flowers in this are subsessile, the calyx closed, the petals with clear distinction of blade and claw. It is possibly a monotype.

G. FLAVESCENS. Torrey, under *Streptanthus.*

G. HOOKERI. *Streptanthus flavescens,* Hook.

S. campestris, Wats., by the specimens, as also by the original description, was a sorry medley from the very outset. By the specific name the plant from Campo must be received as the type. The material of that is fragmentary; but its calyx herbaceous, purple, the sepals all alike and exact, not spreading. It may well hold its place and name under *Streptanthus* until better known.

The plant of the San Bernardino Mountains mixed with the above in books and lists is exceedingly remote from it in both habit and character, and can not be consistently admitted into any of my streptanthoid segregate genera. I name it in the type of a new genus,

AGIANTHUS. Calyx almost that of *Euclisia,* nearly as irregular, its sepals thin, whitish, translucent, also loosely investing the Euclisia-like petals, stamens, etc., but the whole calyx remarkably short, each sepal broad and blunt at summit. Pods large, narrow, more or less tortuous. Plants all perennial, in foliage altogether much like *Cartiera.* Specimens of two species are before me.

A. BERNARDINUS. Basal leaves cuneate-obovate to spatulate-oblong, rather obscurely dentate mostly at and near the summit: pods very narrow, almost 4 inches long, spreading or even recurved and tortuous.—San Bernardino Mountains, Parish; also San Jacinto Mountain, H. M. Hall. both as *Streptanthus campestris.*

A. JACOBAEUS. Basal leaves more broadly cuneate-obovate remotely and lightly yet sharply toothed all around: Pods 2½–3 inches long, firmly ascending, slightly incurved, not tortuous.— Cuyamaca Mountains, San Diego Co., C. R. Orcutt, July, 1889; his n. 1507, as in U. S. Herb.

Mitellastra and Rubacer.

Naturally interested, and even deeply and somewhat peculiarly interested, in the new "NORTH AMERICAN FLORA," I was startled when for the first time I looked over the pages of the Saxifragaceae, as I read that queer innovation in generic nomenclature, the name *Mitellastra;* for I had not used or read the page of Mr. Howell's book whence the name, impossible as that of a genus, is said to have been taken. From my friend in the Oregonian field, most capable as an observer and a reasoner upon matters of mere taxonomy, I should with reason expect errors, and maybe grammatic impossibilities, as to Latin nomenclature.

Now, in the very metropolis of all North America, whence this new Flora of so great worth and such bright promise emanates, there should be available the services of some one in whose mind such mere fundamentals of phytography as I shall name have found a lodgment. One of these fundamentals is the knowledge that each genus and each species is an abstraction of the mind, and, as such, a unit; that every particular genus and every particular species is as certainly a unit as every individual plant is a unit; that, therefore, every generic name and every specific name is necessarily of the singular number. The other fundamental is, a fair knowledge of the declensions of Latin nouns and adjectives; for it is still everywhere professed that Latin is the language of botanical nomenclature.

One mentally equipped with these simple rudiments of phytographic knowledge sees at first glance that *Mitellastra* is a plural; that as the name of a genus it must appear as *Mitellastrum.* That violence to grammar which defaces the page as

LEAFLETS, Vol. I. pp. 229-244, Sept. 24, 1906.

it stands would have been less flagrant had the specific name appeared as *Mitellastra caulescentes,* for so, the substantive and participial terms of it would have been at that agreement which the law of the language so inflexibly demands; though the very idea which I thus put forward presupposes recognition of *Mitellastra* as the plural that it is, which quality the author neither saw for himself nor was taught to see.

What I have now said is conclusive and might suffice; but I am learning to forestall frail subterfuges. Here no shelter can be taken under the name of Asa Gray. He made the name *Mitellastra.* If I say that he made it for the name of a genus, or that there is the least probability that he thought of it as a future generic name, I state an untruth, and am become a great and good man's calumniator. He framed *Mitellastra* as a sectional name, and in the plural, as is correct. Mr. Rydberg, on page 98 of the said Flora, has propounded ten sectional names under *Heuchera,* all of them in the plural, as they should be; but if some botanist of the future, taking those his ten sections for genera, and the ten sectional names for generic names, shall proceed to write for species *Bracteatae bracteata, Pilosissimae pilosissima, Rubescentes rubescens,* and so to the end of the seventy, he will be following to the letter Mr. Rydberg in the case of *Mitellastra caulescens;* for, grammatically, the whole seventy-one will be exactly parallel.

That *Rubacer* means red maple, the author of that name himself placed beyond dispute when he printed that combination *Rubacer odoratum.* The ending *um* is absolutely fatal to the witless claim that any *Rubacer* is a *Rubus* and not an *Acer.* When on page 211 of this volume I presented that argument I called attention to its character as unanswerable. In a recent display of loosely scattering polemics[1] the author of the synonym *Rubacer* leaves unrecalled this particular point I made. There may be readers who may charge this to the supposed dis-

[1] Torreya, vi, 165–169.

cretion of evasion; who will say the point was left out of view because of its obvious fatality to what Mr. Rydberg was contending for. I can and shall take my opponent's part against every such probable assailant of his scientific candor and sincerity; for I see it to be easily possible he may not have discovered in that argument of mine anything of the pointedness it carries. Its momentum as an argument lies in the difference of meaning that subsists between such Latin word-endings as *um* and *us.* It is evident that Latin endings indicating number, gender, etc., may chance to be slow in making their several impressions. Probably not until he reads, or is told, what I have said above, will it enter Mr. Rydberg's thought that *Mitellastra* is not the feminine singular that he guessed it to be, but a neuter plural.

The paragraph that occupies the greater part of page 166 I can make nothing of beyond a curious display of innocency of the art of word construction and a medley of self-contradictions, save only that into the midst of this marvel of a paragraph there is thrust this refreshing bit of mother wit: "If I prefer to call the old *Rubus odoratus* L. a raspberry-maple instead of a maple-raspberry, I am well within my rights." I am truly glad of this fine pronouncement, because it can not be disputed; but it can never have the least bearing on the plain fact that by that adjective ending *um, Rubacer* is a maple in its meaning.

More than two pages are given to the statements regarding the identity of *Rubacer* and *Bossekia.* They reveal to the careful reader much more of their author's mind and purpose than I shall here point out. One or two things are said in such just criticism of me that, were I sensitive and vain-glorious as I might be, I should feel deeply humiliated. At the same time, in this part of the paper, rash and unwarranted statements follow one upon another in continued and close succession. Here is a selection from among them:

1. "There is nothing in Necker's diagnosis that points directly to *Rubus odoratus.*" This is untrue.

2. "It is only from the fourth and the last lines of the diagnosis that any clue can be had." Very far from the truth.

3. "Supposing that Necker had the first edition of Linnaeus' Species Plantarum, there are in it but two species of *Rubus* with simple leaves, *R. odoratus* and *R. Chamaemorus.*" Also untrue.

4. "*Rubus Chamaemorus* has many pistils and many drupelets." Not so; for out of the 12 Linnaean Rubi, 9 have many drupelets, 3 from very few to few, and Chamaemorus is one of these; not rarely with only 5 or 6 drupelets, though these few are large.

5. "Necker must, therefore, refer to this [second] edition, or else to the third, which is practically identical." Certainly a most queer proposition to follow upon the very heels of the mention of *Dalibarda*, which Necker could never have quoted from any edition but the first! That proves that he had the first edition and quoted it. In it *R. odoratus* has precedence over both *R. Chamaemorus* and *Moluccanus*, which latter we are told is not in that first edition!

6. "Or else to some edition of the Systema, perhaps the 12th or 13th. In either case the problem becomes much more complicated, because in all of these there are not less than four species of *Rubus* with simple leaves." All this not worth the space it takes in Torreya and here, since it is all deduction from quotations 2 and 3, both of which I here again pronounce utterly truthless. Mr. Rydberg will have to concede that all ground of bibliographic complication is forever removed, when he finds that in that book, glanced at all too hurriedly, all the simple-leaved Rubi hold places, *odoratus* the highest and *Moluccanus* the last and lowest.

7. "*R. Chamaemorus,* * * certainly intended by Necker as a part at least of his *Bossekia.*" Wholly unwarranted statement. The character definitely excludes it.

8. *R. chamaemorus,* * "the European species best known at the time." Wholly irrelevant; because *Chamaemorus* can

not be put into *Bossekia* but by altering the published diagnosis of the latter. Omit the word "European" and what is left is false. *R. odoratus* "at the time" was known to hundreds of botanists in Europe who had never seen *Chamaemorus.*

9. "Should not this [*R. Moluccanus*], according to Dr. Greene's own interpretation, be the type of *Bossekia?*" The questioner concedes that Necker in making group distinctions emphasized habit; also that *R. odoratus* is at least a part of *Bossekia.* I now answer this one question by eight questions, any one of which is a severe rebuke of my respected colleague's utter recklessness in writing. (1.) Can Necker be believed to have referred to the same genus with *R. odoratus,* a blackberry pure and simple, weak, straggling and prickly? (2.) Before putting his question did our critic not ascertain that *R. Moluccanus* is a blackberry pure and simple, straggling and prickly-stemmed? (3.) Has our long-time specialist in Rosaceae yet to learn of native American blackberries which, as seedling plants, and up to the year of their first flowering and fruiting, bear none but simple leaves, then in their fuller maturity only compound leaves? (4.) Does he need from me the information that one such American blackberry came to be published at first for two distinct species because of this twofold appearance? (5.) Has he looked into the history of *R. Moluccanus* far enough to see that the earlier author, from whom Linnaeus borrowed all his knowledge of it, published as his type of the species an Asian blackberry with leaves compound? (6.) If so, did Mr. Rydberg not go on and ascertain that the simple leaved one was made by Rumph no more than a variety of the other? (7.) Is not then the Linnaean *Moluccanus,* after all, to be viewed as a mere younger state of *R. parvifolius?* (8.) Will our friend of the Torreya disputation say that Necker in all probability knew not these freaks of blackberries?

This column of impeachments must end here for want of time and space. But nine specifications of truthlessness indicated from these pages of Torreya should suffice for the present

purpose, and especially since I find no ground of suspicion that any one of those nine falsifications was made intentionally. The misfortune of their author seems to have been the assuming that, since the day in last April when I placed in his hands a volume of Necker opened at a certain page,[1] he has believed himself grown competent to discuss that author with safety; whereas I after many years of occasional wrestling with his terms and his taxonomy, know that I may stumble. No; my opponent has not meant those misstatements nine. He has but written his name large on the list of those who

"—— —— rush in where angels fear to tread."

Under no consideration can Necker have thought of placing a blackberry congeneric with *R. odoratus.* That was a most vain imagination, born of ignorance more dense than mine when I suggested for *Chamaemorus* a place, in Necker, under *Dalibarda.* I had never seen that type growing, nor knew that it is dry-fruited; otherwise I should have understood rightly that term "nuda" in Necker, which he took up from Linnaeus, as I now perceive. But this error of mine, which I rejoice in Mr. Rydberg's having been able to correct, would not have been committed, even in my ignorance of *Dalibarda*, had I found *Chamaemorus* admissible to Necker's *Bossekia*, the most essential character of which excludes it to a certainty. *Bossekia* has "very many" drupelets, *Rubus* has from "several to rather many," plures being able to bear all that breadth of meaning, but no more; the "plurimi" in the *Bossekia* diagnosis, being absolutely superlative, means it has the greatest number occurring in any of these plants; and it is true.

Chamaemorus often has a fruit of no more than five or six drupelets, very large; *Rubus* of Necker, any small or moderate number of them, but perhaps never more than half as many as the *R. odoratus* average. Nor is this all. Even the calyx of *Rubus* and *Bossekia* has, according to Necker, its own character

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[1] I had not written, as yet, a word about *Bossekia*: but the very name was that day new to the other party.

in each. In a word, the character of *Bossekia*, as Necker really gave it, excludes from the genus completely every *Rubus* known at that time save *R. odoratus* alone. Yet Mr. Rydberg says: "There is nothing in Necker's diagnosis that points directly to *R. odoratus*. It is only by inference that any one may come to the conclusion that that species is intended." The first sentence of this is already on my list of absolute falsities; nor do I think the cause of truth and science can ever demand its removal thence. But now a word upon the philosophy of that delectable phrase, "only by inference."

One side of the moon Mr. Rydberg and I, under favorable conditions, may see to be a hemisphere. The other side of it we shall never see or be able to visibly match with the hemisphere we do see (as we might match two different specimens of *Rubacer*). Do we know that the moon's invisible side has a convex and not a plane surface? Assuredly we do know it, and as certainly, "only by inference." Do we know that this planet whereon we botanize is spherical? Its sphericity no man ever saw or will see. We do know it a sphere, but "only by inference." Why have learned men and masterly botanists, Linnaeus, Jussieu, Endlicher, Bentham, Gray, and some hundreds more—why have they published thousands of plant genera by diagnosis only, citing not a type? Solely for the convenience of those who, competent to use such books, infer to a certainty the generic identity of things from those diagnoses alone. Did my friend when he published the *Rubacer* diagnosis not expect each possible finder of an unknown species of it, if a botanist, to be able to infer to a certainty the genus from his description alone? If not, then he wastes time, ink and paper in writing diagnoses; for these are then a dumb show; a useless mere formality. What use in a Gray's Manual, a Britton's Manual, a De Candolle's Prodromus, or any of the untold thousands of other such books, but through this, that untold thousands of educated people, competent to use them, may infer to a certainty the genera and the species by the diagnoses alone?

This "only an inference" compels the inference of sorry limi-

tations in philosophy; and so does the following: "*Bossekia* is not properly published," etc. Mark the distinction. It is not said that *Bossekia* is not published, but only that its publication is not "properly" made; is not, as to form and method, conformed to the newest and latest edition of a certain "Code." One not too near-sighted must readily foresee here the open door to utter lawlessness as to the adoption of generic names. Under the distinction made, each earlier edition of Linnaeus' great Genera Plantarum may be closed and shelved. Genera may not be cited from it, because, though adequately published, they are not "properly" published! This thing has already been done, and I now see why. Again, and for a different illustration. All the new genera of Bentham, published in his Genera Plantarum, without naming species, have no status as genera. To the man who first identifies, by sure and certain inference, the species of such genus and gives them names, and not to Bentham, will be ascribed the authorship of each such genus! If he choose to ignore Bentham's generic name and coin a new one, Mr. Rydberg will adopt that new one, (despite his own saying that the law of priority is fundamental), and relegate the prior name to synonymy. In the case of Necker's genera, I may prove to all the botanical world the identity of one of his genera, declaring its type beyond all question. Mr. Rydberg may admit that it is published, but not "properly," and uphold stubbornly his own synonym of that genus, and make Necker's clearly published name the synonym. This will be lawlessness; and I shall look for a flood of it.

I am under renewed obligations to the writer in Torreya. He has lightened the darkness of my former ignorance about *Dalibarda*. He has given me a fine array of texts—several here unnoted—to head some chapters of a partly written volume. Since the first reading of his paper I enjoy a deeper insight into the meaning of that ancient worthy who once exclaimed:

"Oh! that mine adversary had written a book!"

An Orchid Note.

Solomon Conrad's paper of 1829, on *Corallorhiza Wisteriana,* falls short of being the original publication of that species; for Rafinisque a dozen years earlier had just made that plant the type of a new genus under the name of *Cladorhiza.* He calls the species "*Cl. maculata,*" in evident allusion to the notably spotted lip of the flower. To this organ, the lip, he ascribes three essential characters. It is "spotted, elliptic, obtuse, crenate," which I note as a more perfect description of that organ than either Conrad or any one else since Rafinesque's day, in so far as I have read seems to have given. None but he mentions the crenulate character of it, though the figure in Britton & Brown clearly shows it.

I here present the fuller account, as to its history, of what I should call

CORALLORHIZA MACULATA. *Cladorhiza maculata,* Raf. Am. M. Mag., i. 429 (1817).

Corallorhiza Wisteriana, Conrad. Journ. Philad. Acad., vi, 145 (1829).

As a frequent plant in woods on the outskirts of the Philadelphia of the early nineteenth century, it might be expected that Rafinesque would have been the first to note its character, for he was familiar with the Philadelphia region at the time.

Certain Rosaceous Genera.

From the view of *Potentilla,* as a fair aggregate of many subgeneric types—the view I took nineteen years since[1]—I have long since receded. Mr. Rydberg has taken a middle ground, which is logically untenable. But he has brought out several new characters for each of several segregate genera, and this so clearly that I must concede the untenability of my former position. But neither can I conform to his scheme. If *Horkelia* and *Drymocallis,* just alike in habit, are distinct, then is *Tridophyllum,* so peculiar in habit, flower and fruit, also an excellent genus.[2] If *Argentina* be separate from *Potentilla* it is by habit

[1] PITTONIA, i. 95–106. [2] LEAFLETS, i. 188.

and inflorescence alone, and from this there seems to follow necessarily the conceding of equal rank to what I shall call

CALLIONIA. Perennials with typically a solitary slender stem ascending, never erect, bearing about two long-peduncled flowers, one in the axil of as many middle stem leaves, the stem after flowering becoming greatly elongated, trailing and sarmentose. Calyx rotate in anthesis, the 5 bractlets equaling or often quite surpassing the segments, their tips often seen projecting beyond the summit of the broad rounded petals.

Let no one wrestle with any supposed etymology of *Callionia.* One need not know that it has any. It is an euphonious designation of what to me is the most charmingly modest and beautiful of our potentillaceous types. The species are, at least in part,

C. CANADENSIS. Linn., under *Potentilla.*

C. SIMPLEX. Michx., " "

C. PUMILA. Poir., " "

We have, in the eastern United States, three groups of shrubs which, in colloquial speech, we distinguish as Blackberries, Red Raspberries and Black Raspberries, the latter otherwise known as Blackcaps. The old ruling, that these three very natural groups should be but sections of one genus, *Rubus,* I have long submitted to with mental reservation. A hint of my real opinion was given in my Flora Franciscana some fifteen years since. I wish now to express that opinion without reserve.

BATIDAEA (Dumortier, as subgenus.) Stems the first season erect, armed with straight prickles (usually soft and innocuous in Eastern species), and clothed with pinnately 5-7-foliolate leaves. Flowers inconspicuous; petals small, dull-white. Fruits separating from the receptacle; drupelets rather many, soft, very juicy and perishable; pyrene reticulate, obtuse and without keel on the back. Best known species *Rubus Idaeus,* Europe.

The North American species are many, mostly hitherto unrecognized.

B. STRIGOSA. *Rubus strigosus,* Michx., the original from Canada; but, between the high Northeast and the mountain dis-

tricts of the South, there occur several excellent subspecies to be distinguished. Those proposed below are western.

B. HETERODOXA. Stems and slender flowering branches deep red-purple, the latter sparsely hispid, otherwise glabrous, but pedicels with also a short pubescence: leaves very diverse, the lowest 3-foliolate, those next them simple, deeply 3-parted, the uppermost slightly lobed to merely ovate; the margins of all incise-serrate, all deep-green and plicate-rugose above, white tomentose beneath: calyx hispid and glandular, segments triangular, acute.

Woods at Clarke, Indiana, 29 May, 1897, L. M. Umbach, U. S. Herb.

B. AMPLISSIMA. Stem and branches vivid green, sparsely both hispid and with short fine gland-tipped hairs: foliage pinnately 3-foliolate, thin, very ample, odd leaflet ovate, 3½ inches long, 2½ inches wide, coarsely and doubly crenate, all green on both faces when mature, only the youngest hoary beneath: pedicels hispid with many short and few long and spinescent hairs all gland-tipped: calyx sparsely aculeate and pubescent, its segments ovate, acuminate.

Warren's Woods, Brookings Co., S. D., 17 June, 1893, Thornber, U. S. Herb.

B. ELEGANTULA. Stem and branches nearly glabrous, a few short scattered hispid hairs seen under a lens: leaves very thin and delicate, 3-foliolate, on slender petioles sparsely short-aculeolate and finely glandular-pubescent; odd leaflet ovate, acuminate, 2 inches long, all regularly and most elegantly double-serrate, the teeth all very acute, lower face whitish with very fine tomentum: pedicels glandular-hispid; calyx sparsely aculeolate, its segments ovate, but with greatly elongated acumination.

Pokegama Lake, Minnesota, June, 1891, J. H. Sandberg, n. 214, as in U. S. Herb.

B. ITASCICA. Stem and branches almost completely devoid of both bristles and pubescence, the whole, even to the pedicels, appearing glabrous: odd leaflet 2 inches long, rhombic-ovate, all three simply and somewhat crenately serrate, of thin texture

glabrous and glaucescent above, pale beneath: calyx without trace of hairs or acueli, but puberulent.

Itaska Lake, Minnesota, July, 1901, J. H. Sandberg, n. 1173, as in U. S. Herb.

B. Dacotica. Stem stout, setose-hispid, with rather soft aculeae and hairs; flowering twigs with very few bristles and copious soft glandular-viscid hairiness: foliage thin, deep green above, whitish tomentulose beneath, also sparsely aculeolate on the veins; odd leaflet narrowly somewhat cuneate-obovate, or else obovate, 1½ to 2½ inches long, doubly incise-serrate; pedicels and calyx hispid, segments of the latter long, caudate-acuminate.

Black Hills of S. Dakota, July, 1892, P. A. Rydberg, n. 657, as in U. S. Herb.

B. acalyphacea. Main stem very hispid with stout straight prickles; flowering twigs less so, their prickles shorter, slenderer, deflexed, with very many unequal hairs intermixed, all strongly gland-tipped, the same double indument clothing petioles, rachis, and even the midvein of the leaves beneath; odd leaflet oval, acute or acuminate, all three incise-serrate, plicate-veined above, green beneath, even the veinlets there aculeolate: calyx aculeate and grandular-hairy, even to the tips of the long-acuminate segments.

Yellowstone Park, 28 July, 1902, E. A. Mearns, n. 2353, as in U. S. Herb. Remarkable nettle-leaved species, with strong armature.

B. subcordata. Less prickly than the last, more glandular also glaucous: odd leaflet subcordate-ovate, acute, doubly serrate, all white-tomentulose beneath and apt to be aculeolate on the veins: calyx more deeply cleft than usual, aculeolate and glandular-hairy almost throughout: fruits very small, often of but 6 or 7 drupelets and not equalling the calyx.

Yellowstone Park, E. A. Mearns, nn. 2553 and 3689, as in U. S. Herb, collected July and Sept., 1902. Also Union Pass, Wyoming, A. Nelson, n. 997.

B. laetissima. Stem without bloom, red-brown, hispid with slender weak prickles; twigs and thin delicate foliage all

light-green, not even the indument reddened: odd leaflet broadly ovate, 2 inches long, 1½ inches wide, merely acute, doubly serrate-toothed, all pale beneath with very light and thin tomentum, all veins aculeolate: calyx densely aculeolate but not glandular.

Middle or northern Colorado, apparently, and in the lower foothills only, Cowen, 17 June, 1895, n. 149, as in U. S. Herb.

B. UNICOLOR. Young stem and twigs glaucous, less hispid, mature foliage green alike on both faces: leaflets narrower; the odd one ovate to rhomboid and oblong-lanceolate, doubly serrate, the laterals small in proportion, all aculeolate on the lower part of the veins beneath: calyx with broad ovate-acuminate segments and both lightly glandular-hairy and aculeolate.

Near Red Lodge, Montana, 27 July, 1893, J. N. Rose, n. 52, as in U. S. Herb.

B. PERAMOENA. Mature stems nearly smooth, the bristles short and very sparse; twigs and pedicels showing rather more numerous and longer gland-tipped hairs; leaves ample, thin, green and glabrous on both faces when mature, rather copiously aculeolate on the veins beneath; odd leaflet ovate to oval, 2 inches long or more, acuminate, lightly incised, the lobes serrate: calyx both finely aculeolate and glandular-hairy almost to the tips of the long triangular-subulate segments.

In meadows along the banks of St. Mary's River, Idaho, June, 1805, J. B. Leiberg, n. 1105, as in U. S. Herb. Of most elegant thin green long-pointed foliage.

B. CATAPHRACTA. Densely armed, both as to the main stem and twigs, with rigid prickles, some longer and straight, others shorter, widened at base and slightly deflexed, this armature supplemented by as many short, rather rigid gland-tipped bristles; leaves small, deep-green on both faces in age, the younger white tomentose beneath, the veins of all beneath closely beset with strong flat prickles, with others short and subterete intervening; odd leaflet ovate, acute, simply or doubly serrate, 1¼ inches long: calyx and pedicels glandular-pubescent beneath a strong armature of prickles.

A dwarf petrophilous species from head of Pettit Lake, Idaho, L. F. Henderson, 1895, n. 3598, as in U. S. Herb.

B. Sandbergii. Tall and stout, reddish-hispid as to stem, twigs, pedicels, petioles, and even the veins beneath, but prickles more uniform than in the last, none as stout, none obviously flattened except those of the leaves beneath: leaves of the twigs commonly 5-foliolate, deep green on both faces when grown, sparsely strigose hairy above, not so beneath; odd leaflet broadly oval to rhomboid-ovate, all merely acute, doubly or simply incise-serrate: calyx strongly aculeate and puberulent.

Packsaddle Peak, Idaho, Aug., 1892, Sandberg, McDougal and Heller, n. 859, as in U. S. Herb.

B. filipendula. Dwarf, but stout as to the stem, the short twigs and long pedicels slender, only the main stem very hispid: leaves small, pale beneath, the indument only very obscure except in those young and growing: odd leaflet deltoid-ovate to rhomboid, hardly an inch long, acute: fruiting pedicels slender, pendulous, aculeolate; calyx seldom bristly, commonly only puberulent.

Lost River Mountains, Idaho, Aug., 1895, L. F. Henderson, n. 4039, as in U. S. Herb.

B. viburnifolia. Stem stoutish, tortuous, perhaps tall, sparingly hispid; twigs tortuous, thinly and softly hispidulous: leaves of a clear bright green on both faces, glabrous above, also beneath save as to scattered bristles or slender prickles along some veins; odd leaflet deltoid-ovate, 1¾ inches long, acute, sharply serrate, the veins elevated and conspicuous beneath: calyx with a few prickles at its base, the segments only puberulent: fruit uncommonly large, apparently amber-color or yellowish.

Selkirk Mountains, B. C., Aug., 1904, C. H. Shaw, n. 472, as in U. S. Herb.

B. subarctica. Stems tall, stout, hispid with rather sparse short slender prickles; twigs very leafy, scantily and shortly glandular-hispid, the bristles very diverse as to length and thickness: foliage firm, dark-green above, much plicate, pale

beneath, with a fine downy rather than tomentose indument; odd leaflet 2 inches long, ovate, abruptly acuminate, almost simply serrate-toothed: peduncles and pedicels densely glandular-hispidulous: calyx aculeolate at base, the segments cinereous-puberulent: fruit small, very downy.

Porcupine River, northeastern interior of Alaska, 1891, J. H. Turner; type in my herbarium.

B. Arizonica. Low but upright, the stem sparsely but stiffly aculeate; twigs, petioles, and even rachis of the leaf more densely hispid with shorter prickles; leaflets usually 5 even on fruiting twigs, the odd one cuneate at base and of more or less rhomboid figure, all acute, doubly incise-serrate, glabrous above, white-tomentose beneath even in fullest maturity: pedicels and calyx densely glandular-hirtellous and with frequent large and stout prickles: calyx large for the plant, its base aculeolate, its deltoid-ovate segments almost caudate-acuminate, often narrow, foliaceous at the very tip.

Mountains of Arizona and New Mexico to those of at least southern Colorado; the type from the San Francisco Mountains as collected by myself in 1889.

Melanobatus. Stems greatly elongated and arcuate, glaucous, prickly, the prickles flattened and recurved. Leaves pinnately (rarely pedately) 3-5 foliolate. Flowers not showy, the calyx parted almost to the base. Petals small, dull-white. Fruit hemispherical, parting from the receptacle; drupelets small, the pulp scanty, firm rather than watery. Reticulation of pyrene running into a keel on the back.

Genus wholly American, recalling the Old World subgenus or genus *Glaucobatus* (Dumortier); but they are only bluish proper Blackberries, not Raspberries. The species of Melanobatus are few.

M. occidentalis. Linn., under *Rubus*.
M. neglectus. Peck, " "
M. leucodermis. Dougl, " "

M. GLAUCIFOLIUS. Kellogg, under *Rubus.*

M. NIGERRIMUS. *Rubus hesperius,* Piper, Eryth., v. 103.

M. MICHIGANUS. More sparsely and feebly armed than *M occidentalis;* leaflets longer, narrower, less incised; the odd one lance-oblong or narrow-ovate, 2½ inches long, all merely pale beneath, scarcely white even when half grown: pedicels with few and reduced prickles but a rather copious short glandular hairiness.

Woods near the Agricultural College, Michigan, C. F. Wheeler, 1895.

M. BERNARDINUS. Rather low, excessively and stoutly prickly even to the midvein of the leaflets: foliage small, deep green above, white beneath; odd leaflet 1¼ inches long, quite as wide, broadly ovate to deltoid-ovate, somewhat 3-lobed now and then, otherwise doubly serrate-dentate: pedicels with few strong prickles and a dense glandular short indument.

Mill Creek Falls, San Bernardino Mountains, Cal., S. B. Parish, June, 1901, n. 5046.

PARMENA. Raspberries, but with the habit of upright Blackberries, though less prickly, sometimes almost unarmed. Leaves 3-foliolate, or some simple. Flowers few or solitary, large, with rose-red long petals: calyx 5-cleft, very closely reflexed under the fruit; this large, of very many drupelets. Pyrenes strongly favose-pitted, but low-keeled on the back.

P. SPECTABILIS. Pursh, under *Rubus.*

P. MENZIESII. Hook., " "

CARDIOBATUS. Technically a true Blackberry, small, trailing, very prickly, even to the round-cordate simple foliage. Stipules foliaceous. Flowers solitary in the leaf-axils, short-pedicelled: calyx quite divided, the sepals very unequal, one large, often foliaceous, more or less enfolding the narrower, the whole calyx erect in fruit, enfolding the very small fruit of few drupelets. Petals rose-red, showy.

C. NIVALIS. Doug., under *Rubus.*

PSYCHROBATIA. Slender and subalpine herbs, prostrate, rooting at the nodes. Leaves pedately compound, with foliaceous stipules. Flowers white, solitary on long filiform peduncles. Calyx of 5 nearly distinct sepals often toothed near the summit, as also the petals. Pistils very few, only two carpels maturing, becoming a pair of large glabrous red drupelets too weighty for their delicate peduncle and lying on the ground. Pyrenes sparingly wrinkled, not reticulate.

P. PEDATA. Smith, under *Rubus*.

COMAROBATIA. A prostrate unarmed undershrub, sometimes rooting at the nodes. Leaves simple, 3-lobed, or now and then quite divided into 3 leaflets. Peduncles erect in both flower and fruit, 1–3-flowered. Sepals ovate, entire, acuminate or cuspidate, unequal. Petals broad and obtuse, white. Pistils very few; ovaries silky-tomentulose, several maturing to large villous drupelets. Pyrenes lightly wrinkled.

C. LASIOCOCCA. Gray, under *Rubus*.

CHAMAEMORUS, Clusius, Hist. 118 (1601.) Unarmed, mainly herbaceous low upright perennials. Leaves simple; stipules large, oval. Flower solitary, terminal: calyx 5-parted almost to the base; sepals erect, partly covering the fruit; this of few large very juicy drupelets adhering to their receptacle. Pyrenes large, smooth.

C. ANGLICA, Clusius, l. c.

C. NORWEGICA, Clusius, l. c., 119.

LEAFLETS OF BOTANICAL OBSERVATION AND CRITICISM, Vol. I, pp. 245-247. 17 Oct., 1906.

Some Oriental Rubus Allies.

If I gave to the genus PARMENA an oriental name, it was with the fact in mind, that it seems to have its fuller development on the Asian shores of the Pacific. There the species are all simple-leaved, yet in habit, inflorescence, flowers and fruit, apparently at full agreement with *Rubus spectabilis.* Several of them will take names as follows under PARMENA.

P. PALMATA. Thunberg, under *Rubus.*
P. INCISA. " " "
P. GRAYANA. Maximowicz, " "

A most interesting congener of the Northwest American BOSSEKIA NUTKANA (=*Rubus Nutkanus,* Moc.) occurs, as might have been anticipated, in Japan; that is to say,

B. PELTATA (=*Rubus peltatus,* Maxim.) With the habit. inflorescence, and flower of typical BOSSEKIA—even to the excessively numerous pistils that Necker makes the most essential character of the genus—the oriental species is not wholly unarmed. Its specific name points to the fact that the two basal lobes of the angled foliage, instead of forming a sinus as in other species, are quite grown together, so that technically speaking the leaf is peltate.

In habit and foliage suggestive of our American *Dalibarda,* yet extremely unlike it in character, is a Japanese type which I may denominate

CALYCTENIUM. Herbaceous perennial, prostrate, rooting at some nodes. Leaves orbicular, simple, dentate; stipules foliaceous but laciniate-parted. Peduncles solitary, terminating upright leafy branches, these and also the petioles aculeolate, the calyx very densely so, and with long straight prickles; segments of calyx unequal, large, 2 usually smaller and subentire, 3 deeply pectinate-pinnatifid. Petals white, abruptly unguiculate. Pistils rather many.

C. PECTINELLUM. Maximowicz under *Rubus.*

A New Bland Violet.

VIOLA MINUSCULA. Allied to *V. blanda* and white-flowered, but extremely small, the largest plants only 1½ inches high, growing in dense matted masses: leaves small, on petioles shorter than the blades, these subreniform-orbicular, ¼ to ½ inch long, hardly as broad, very obtuse, faintly crenate, glabrous on both faces, the petioles, especially of the later season, hirtellous: peduncles quite surpassing the leaves, prominently bracted below the middle; sepals oval and oblong-elliptic; corolla white, large as in *V. blanda*, not fragrant. Plant in summer not larger than in spring, producing most delicately filiform stolons and a few very short-stalked parthenogenetic flowers; the succeeding pods long and narrow.

This interesting violet has been sent me from western New York, Chatauqua County, by Mr. William B. Limberger, with full notes of its habitat, and characteristics as differing from *V. blanda*. It is said to be the very first of all violets to appear in the spring, in that region; being three weeks earlier than *V. blanda*. Its habitat is wet meadows, where it is associated with that small low caulescent violet, *V. cardaminefolia*, Greene. *V. blanda*, a plant always several times larger, has a different habitat in the region, and is never seen growing with or near *V. minuscula*.

On page 228 preceding I twice wrote, inadvertently, GUILLENIA ROSTRATA, where it should have been G. LONGIROSTRIS, etc.

ERRATA.

Page 28, line 14, for on read or.

Page 42, " 25, for margined read marginal.

Page 73, " 3, after California insert by.

Page 73, " 7, for diagnosis read diagnoses.

Page 79, for *Crythanthe* read *Cryptanthe.*

Page 88, " 8, after had insert been.

Page 96, for *stellaroides* read *stellarioides.*

Page 158, " 8, for Elthamensis' read Elthamensis.

Page 185, at foot of page, for 1905 read 1906.

Page 196, line 15, for Conduz read Tonduz.

Page 228, line 14, for exact read erect.

Page 230, for *caulescentes,* read *caulescentia.*

Page 240, line 2, for acueli read aculei.

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